RESOURCE CLASSIFICATION SYSTEMS: EVALUATION OF EXISTING SYSTEMS AND A METHOD FOR THEIR SYNTHESIS APPLIED TO THE BLUE RIDGE PARKWAY

by

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CHAPTER ONE: INTRODUCTION

> ...thousands of nerve-shaken, over-civilized people are beginning to find out that going to the mountains is going home; that wildness is a necessity; and that mountain parks and reservations are useful not only as fountains of timber and irrigating rivers, but as fountains of life.
> John Muir (Nash, 1967, p. 140).

INTRODUCTION

A Look At Leisure and Recreation

Leisure is the time we have when other pursuits, most often work-for-pay, are not required. Leisure is an integral part of our lives, "not left over or peripheral" (Kelly, 1983, p. 4).

Leisure has been divided by MacLean and others (1985) into four categories: contemplative, free time, activity and a holistic view, the combination of the other three (p. 5). MacLean's broadened definition of the activity category includes self-fulfillment and is called recreation. Outdoor recreation as discussed in this study, is the pursuit of leisure through the enjoyment and understanding of the outdoors (MacLean, *et al.*, 1985, p. 255).

In 1977, a survey was conducted of 18,000 Americans, by phone and during visits to 150 recreation areas, to assess their attitudes about recreation. These figures are the most recent for this study, conducted every five years. Fifty-nine per cent regarded outdoor recreation as "very important" compared to other activities (Heritage Conservation and Recreation Service, 1979, p. 8). The findings of this poll are supported by the number of participants in activities generally associated with outdoor recreation in parks. Participation in 1982 (225.6 million total population) for camping was 61.6 million, 42.0 million for boating and 63.7 million for fishing (Walsh, 1986, p. 341). If figures for sightseeing, picnicking and other outdoor activities were included, the numbers would increase by additional millions. According to Kelly (1985), recreational resources were used over one billion times in 1979.

Benefits Of Recreation

Recreation can be perceived as a socially desirable activity, since outdoor recreation enriches our lives in many ways. Benefits are of a personal nature as well as a gain for society at large. The benefits may be personal satisfaction, and better physical or mental health. Perceived benefits and behavioral changes are just two of the personal gains from outdoor recreation. Pure enjoyment and better physical and mental health are others (Kelly, 1983).

Recreation supports the meeting of personal goals for a longer, healthier life, and increases personal reflection and appreciation of nature and beauty (President's Commission on Americans Outdoors, 1987).

Society also gains from its citizens participation in outdoor recreation in two ways, one directly and one indirectly. Direct economic benefits are derived from the money spent to pursue outdoor activities ($100 billion on outdoor recreation), (President's Commission on Americans Outdoors, 1987, p. 24). Indirectly and perhaps a more important result is that recreation creates happy, healthy people, who constitute better workers, are less crime-prone and follow societies rules with more enthusiasm. A more satisfied public, promotes family cohesion, economic growth, and increased quality of life are additional benefits (President's Commission on Americans Outdoors, 1987).

National Park Service and Recreation

One opportunity for seekers of recreation is the National Parks. The National Park Service (NPS) was selected for consideration for this study because it is an agency concerned with the management of recreation areas. A history and description of the agency and its structure is part of the background chapter.

In 1986, 281.1 million visits were made to National Parks for recreational use. This figure compares to 222.2

million visits in 1978. An expected increase for the next several years is 3.9% or 292 million visits per year (NPS, 1986, p. 8). Visits to the five environmental type recreation areas (parks, parkways, preserves, recreation areas, and trails) was over 149.9 million in 1985 (NPS, 1986, p. 8). The nation's national parks and other recreation areas are indeed used.

Landscape architects, among others, will be responsible for maintaining National Park holdings as a means for recreation, conservation and preservation of unique lands-- a source of American pride.

GOALS OF THE RESEARCH

The intent of this research, after exploring the process of classification and existing classification systems, is to develop a process for combining existing resource classification systems and to test the process. Classification systems to define resources are in place to divide land areas, including recreation areas. The integrated system is appropriate to meet the goals of a park with a diversity of resources. The purpose of an integrated system is to make management effective in honoring the unique quality of each park. The integration of classification processes, not the preparation of development plans, proposed uses, or policies in response to classified land zones, is the purpose of this study.

DESIGN OF RESEARCH

The research appears in three parts: 1) description of the National Park Service as a provider of recreational opportunities, classification terminology, and examination of existing resource classification systems, 2) explanation of a process that provides a way to combine existing systems using combination techniques, and 3) the application of the proposed decision-making process in a case study format. Results of the process method and its application are analyzed.

SIGNIFICANCE OF THE RESEARCH

As awareness of both the beauty of the parks and the benefit of time spent outdoors grows, visitors will continue to visit parks, and impact park resources. Reducing the consequences of use in context of preservation and other requirements generates a challenge to managers. Management will be called upon to reconcile conflicts and make choices. An awareness of the unique qualities of the character and contribution to the whole of each resource is needed to manage parks most effectively. Often divisions are made for the wrong reasons. Classification can be defined by maintenance or mileage. Another practice places management decisions before consideration of resource foundation. Applying the integration procedures in this study would aid managers of recreation areas to consider the resources. Specific application of the process would occur during the writing of management policies and in making subsequent management decisions.

FORMAT OF THESIS

Chapter two provides a more in-depth look at the concept of recreation, and the National Park Service. The theory and principles of classification form part of the chapter. Discussion of integration of classification systems follows, along with examples of other efforts to integrate systems.

Explanation of the objectives and intent of the study, and the methodology are the purposes of the methodology chapter three. An outline of the proposed investigative process for employing an integrated of several classification system, from existing resource systems, for land based recreation areas is also contained in this chapter. The case study method is selected as a way to test the investigative process. The Blue Ridge Parkway (BRPW), a national parkway in North Carolina and Virginia, serves as a case study and is introduced in chapter four. The selection of the BRPW was made, in part, because the NPS is in the process of writing one of management documents for the parkway. The history, reason for establishment, and past division schemes of the Blue Ridge Parkway begin the case study. Then, the outlined process for selection of systems and integration technique is applied to the Parkway, which emphasizes historic cultural features set in natural beauty. Four individual classification systems were selected for integration and are described. The results of the classification system application will be presented in written and map form.

Chapter five contains findings and their analysis. Findings of the character of the developed process itself are analyzed. Analysis is also made of the process application to the Blue Ridge Parkway. In addition, chapter five contains observations, conclusions and recommendations. How successful for attaining management goals was the application of the integration process? Is the methodology realistic? Recommendations for further study are made as part of that final chapter.

CHAPTER TWO: BACKGROUND

INTRODUCTION

This chapter offers a more detailed look at the components of this research for integration of resource classification systems.

The National Park Service (NPS) was selected for consideration for this study as an agency concerned with the management of recreation areas. A history and description of the agency and its structure is incorporated in this chapter. It is important for later evaluation and comparison of classification systems as a management tool to understand in a broader sense the concept of classification principles. For this reason, a survey of the theory of classification is contained in this chapter.

NATIONAL PARK SERVICE

Historic Beginnings

In the early history, the western United States was vast and unexplored. Upon exploration, wonders never imagined before in the new or old world were uncovered. In the 1800's, many Americans felt their country had a lack of cultural history and art. The discovery of the curiosities of nature in the west lead some people to think American pride could be vindicated (Nash, 1982 and Runte, 1979). Early parks were established to preserve these natural curiosities, keeping them in their original condition. Yosemite, the first national park in concept, was established in 1864; the first National Park in name, Yellowstone, was established in 1872. While cultural anxiety (Runte, 1987, p. 14) was the major rationale for establishment of Yosemite and Yellowstone, their scenic impact was their major value (Runte, 1979). Other grounds for allowing their reserved status was their unsuitability for development and profit-making (Runte, 1979, p. 48).

In the beginning, Congress assumed that areas set aside for parks needed no further protection than a designation of National Park. This assumption did not hold true, even for a short time, as military troops were called in 1886 to oversee and manage Yellowstone.

Military troops were to remain as management of the parks until the appointment of Steven Mather as Assistant to the Secretary of the Interior in charge of parks in 1915. He then began to work for establishment of a park bureau, coordinating those that had joined the plea for this bureau for the parks, now numbering fifteen.

The National Park Service was established in August, 1916, for the purpose of management, enjoyment and perpetuation. The Organic Act declares the mission for the NPS: "[the] purpose is to conserve the scenery and the natural and historic objects and the wild life therein, and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (National Park Service, 1988, 1:1). National monuments under the control of the department of the Interior were also placed under the control of the new National Park Service.

The National Park Service Today

Today the National Parks are considered important as artifacts of conservation, preservation, recreation, and symbols of American pride. Diversity in size and type describes National Park Service holdings. The NPS manages twenty categories of property. Not all of the categories are of the original wilderness nature. Under the jurisdiction of the NPS are Non-national Parks, and National Battlefields, Battlefield Parks, Battlefield Sites, Capital Parks, Historical Parks, Historical Sites, Lakeshores, Mall, Memorials, Monuments, Military Parks, Parkways, Preserves, Recreation Areas, Rivers, Seashores, Trails, the White House, and the largest category when measured in acreage, National Parks (39,363,951 acres in 1986) (NPS, 1986, p. 8).

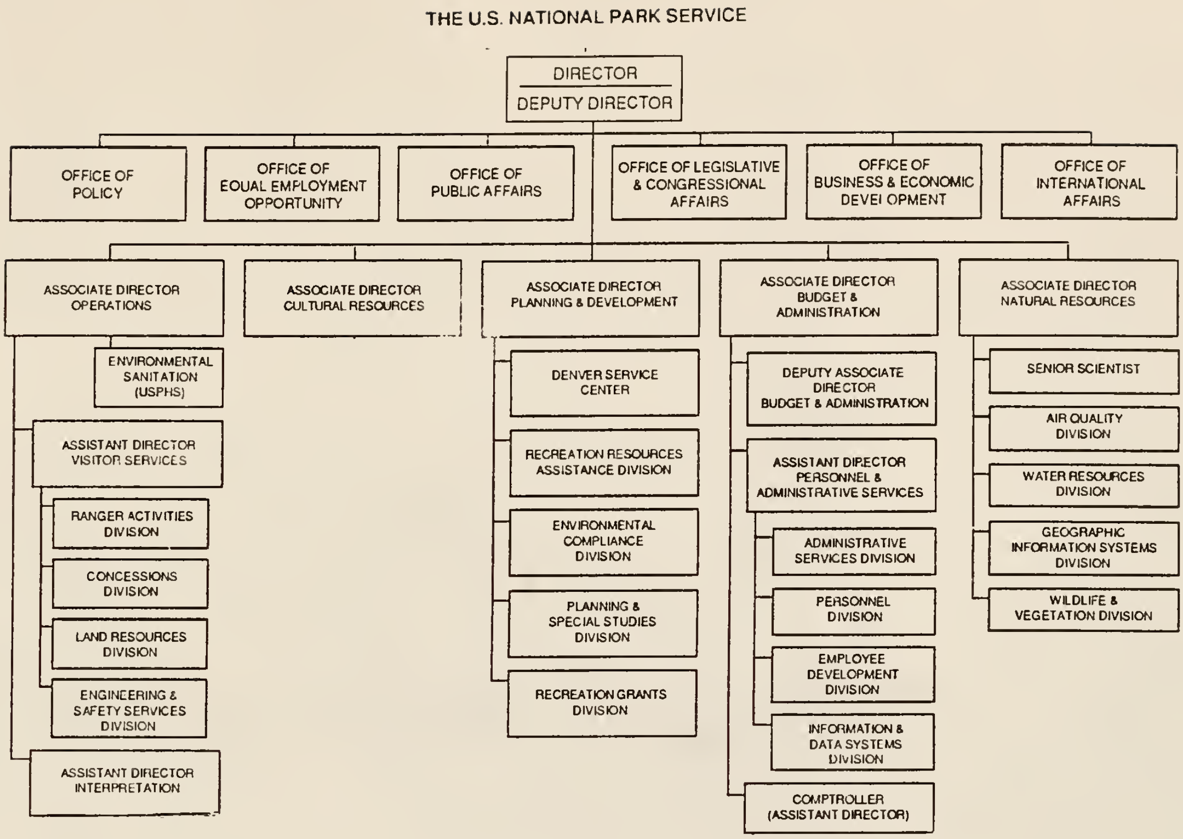
The NPS has a sometimes mutually exclusive dual role as described in the mission statement, to maintain the natural integrity of a unit for future generations and at the same time to allow recreational use. Problems faced by the rest of the United States, such as environmental disturbances, polluted air and polluted water, are present in the national parks. Other concerns are over-crowding and inappropriate use of areas around park boundaries. The conflict continues between development and preservation or conservation of the wilderness land and protection of wildlife. These concerns will not of themselves be the focus of this research, but rather the management of parks in an effective manner, so that problems can be mitigated and resources conserved.

Structure of NPS and the Management of Individual Units

In 1976, the National Park Service (NPS), still under the Department of Interior, had 8000 full-time employees in 11 divisions (see Fig. 2.01: Organizational chart for the National Park Service) and a billion dollar budget (Zaslowsky, 1986). The director of the National Park Service is William Penn Mott.

At the park level, a superintendent is in charge of all aspects of managing a park. He/she is guided by the "Statement for Management" (SFM) and in the wording of the legislative act creating each park. The SFM helps define the mission and goals of each park and includes, among other things, a "concise description of the park's purpose" (National Park Service, 1982, ch.1 p.1).

A General Management Plan (GMP) is usually the next step in park planning and is written as a guideline to assure the goals will be met. The GMP/environmental document combination is the major planning document for all parks (NPS, 1982). Land classification could be used as both an aid in writing the GMP, and in on-going management. Machlis and Tichnell call classification of like park-adjacent lands, zones of compatible use (1985, p. 92). These zones would enable the supervision of each area to more closely follow the function.


THE U.S. NATIONAL PARK SERVICE
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OFFICE OF EQUAL EMPLOYMENT OPPORTUNITY
OFFICE OF PUBLIC AFFAIRS
OFFICE OF LEGISLATIVE & CONGRESSIONAL AFFAIRS
OFFICE OF BUSINESS & ECONOMIC DEVELOPMENT
OFFICE OF INTERNATIONAL AFFAIRS
ASSOCIATE DIRECTOR OPERATIONS
ASSOCIATE DIRECTOR CULTURAL RESOURCES
ASSOCIATE DIRECTOR PLANNING & DEVELOPMENT
ASSOCIATE DIRECTOR BUDGET & ADMINISTRATION
ASSOCIATE DIRECTOR NATURAL RESOURCES
ENVIRONMENTAL SANITATION (USPHS)
ASSISTANT DIRECTOR VISITOR SERVICES
RANGER ACTIVITIES DIVISION
CONCESSIONS DIVISION
LAND RESOURCES DIVISION
ENGINEERING & SAFETY SERVICES DIVISION
ASSISTANT DIRECTOR INTERPRETATION
DENVER SERVICE CENTER
RECREATION RESOURCES ASSISTANCE DIVISION
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PLANNING & SPECIAL STUDIES DIVISION
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ASSISTANT DIRECTOR PERSONNEL & ADMINISTRATIVE SERVICES
ADMINISTRATIVE SERVICES DIVISION
PERSONNEL DIVISION
EMPLOYEE DEVELOPMENT DIVISION
INFORMATION & DATA SYSTEMS DIVISION
COMPTROLLER (ASSISTANT DIRECTOR)
SENIOR SCIENTIST
AIR QUALITY DIVISION
WATER RESOURCES DIVISION
GEOGRAPHIC INFORMATION SYSTEMS DIVISION
WILDLIFE & VEGETATION DIVISION

Figure 2.01: Organizational Chart for the National Park Service. (Source: NPS, 1987).

CLASSIFICATION

A Definition

Grouping objects helps people make sense of their surroundings and offers organization of elements within their world. Grouping objects has a place in many disciplines, from scientific plant names to political state boundaries. Grouping objects has a long history in the scientific community and most explanations are from this background. Taxonomy is more complete, including the science of theory and principles, and rules of classification and identification, rather than the process only.

Classification is both a product and a process. Classification as a process is the ordering or arrangement of objects in sets of likeness on the basis of either their similarities of properties or their relationship (Bailey, *et al.*, 1978 & Sokal, 1974). Classification groups are the product. Also called classification, but termed "identification" for differentiation by Sokal (1974), is the placement of additional unclassified items into already created classes.

Creating a class of objects by relationship is called polythetic. Polythetic classifications are created by judgement that a large number of properties are similar (Sokal, 1974).

Monothetic are systems divided by similarities; each class is different from other classes by at least one property or feature which is the same to all items in the class. Most experts agree the relationship of the objects is the key to producing workable classes (Grigg, 1965, Sokal, 1974 & Bailey *et al.*, 1978).

Classification can be classified, by type, as either aggregation or subdivision. Others use the terms classification and division (Grigg, 1965). Classification is described by Kleckner (1981) as inductive or bottom up and the other is described as subdivision or top down. In aggregation, a system is built with small-like parts to form groups. In subdivision, the whole is divided into smaller and smaller groups. Generally, subdivision is the method used to break up the land into zones or parts. The result of either of the groupings, a hierarchy of classes, is the same. Hierarchy results when each higher level is an aggregation of those below; each class is mutually exclusive (Bailey *et al*., 1978). Systems that are not levels of increasing combination of the proceeding ones are called single level.

Another approach to categorizing classification is to determine whether it is natural (called general-purpose by some and multi by Bailey *et al*., 1978) or artificial (also called special-purpose or single by Bailey, *et al*., 1978). Natural systems serve a large number of purposes while an artificial one serves fewer purposes (Gilmour, 1951). A multi system bases its groups on a large number of characteristics, while a single system uses only one or two characteristics (Bailey, *et al*., 1978). The important difference is the ability of multi/natural systems to produce the most information in a variety of ways and to generalize about the objects, meeting one goal of classification (Grigg, 1965) and creating a more useful system (Bailey, *et al*., 1978).

Inventories, as opposed to classification, are only the listing of features, not designations or evaluations, made from the information.

Why Classify

Classification should be more than an end in and of itself (Grigg, 1965); it should also be regarded as a tool. Its goal is its definition; to discover, describe and name the structure and relationships of similar objects. The value of uniformity of information is the ease of transmittal and the ability to make general statements (hypotheses) about objects and classes for the advancement of a scientific body of knowledge (Sokal, 1974; Grigg, 1965; Kleckner, 1981; & Bailey, *et al*., 1978).

Both Bailey and Kleckner emphasize the importance of classification for resource managers. Bailey describes classification as "important if not essential in managing and understanding natural resources" (1978, p. 650). Kleckner adds another reason for having this knowledge with his statement "classification provides the organizational structure for information used by resource managers ... in the planning process" (1981, p. 65). Once classes are determined, one can more clearly identify and evaluate landscapes, determine their significance and manage them.

Classification Systems in Response to Resources

A variety of division schemes exists for the division and identification of land. Some systems of divisions would be spatial, such as geographic, or political boundaries. Additional ones would be for economic consideration, a particular suitability or susceptibility to development. The objective of each individual classification ranges from preservation to evaluation or identification. These classification systems would be important information for park management but are not considered in the context of this research, which will study resource classification systems.

Resources, generally, are of two types: natural/ environmental and socio-cultural. Environmental resources are natural single-entity elements or a combination of these natural elements. These are not resources in the sense of providing direct economic gain from sale or use. Examples of systems in this category are wildlife, lakes, watersheds or topography.

Socio-cultural resources are landscape components or attributes (features) that take on a value as a result of societal norms (Fabos, 1979). Classification of land-use is also a result of social norms. Also in this group are classifications for human-made objects or alterations in structures or land use patterns, considered acceptable or said to have historic value. Representatives of this type are visual or historical resources.

Once divided, what is classified is called zones or land units. Zoning has been use repeatedly in our society and its merits are widely recognized as a tool that "enables clear, specific, and effective management directions" (Haas, *et al.*, 1987, p. 21). Management of an entire park in the same manner results in homogeneity; the uniqueness of special qualities is lost. Division of land to clarify these differences enables each zone to be managed in a manner to preserve its character (Haas *et al.*, 1987).

INTEGRATED CLASSIFICATION SYSTEMS

Philosophy, reason, purpose

The principle of integrated classification is to develop a system that expresses the "interactive character of the land's elements as a... spatial ...unit" (Rowe in Driscoll *et al.*, 1984). This account of an integrated classification is concerned only for the consideration of environmental aspects (resources) of an area, but its philosophy is sound for the purposes of socio and natural integration. The process in this study will include integration of systems dealing with socio-cultural aspects and possibility for recreational uses. Inclusion of socio-cultural systems is important, as management goals include recreation and visitor use.

Benefits

The benefits of integrating systems are their use in the solving of resource conflicts and in the ability of the manager to more readily tailor systems to management goals. Using one set of zones combined from many systems is of benefit because the manager can conduct the blending to arrive at a plan for management of each unique part of a park, yet retain unity, rather than to apply a variety of zones to a single part. The set of single zones would be less complex to manipulate and more efficient to solve complex land use problems (Corliss, 1974). Of a similar concern is the use of an integrated systems for resource conflict resolution and informed decision making (Pulford, 1978).

Criteria for an Integrated Classification System

Criteria help determine suitability and measure success of an integrated system. One need for integrated classification systems is to tie resources and systems together with a common frame of reference (Whitmore, 1977). It should become a framework for all interests of research and management. The planning need can be met depending on what is required of particular planning problems (Bailey, *et al.*, 1978, p. 650).

The criteria most called for varies little among the authorities. More specifically, those working with integrated classification systems agree the framework should be based on existing knowledge or systems (and their resulting classes and language) (Henderson & Davis, 1978 and Driscoll, 1984) and should be hierarchical (Driscoll, 1984; Bailey, *et al*. 1978; and Henderson & Davis, 1978). The hierarchical criteria allows for planning on all levels and at a variety of scales.

Other suggestions are that an integration be open-ended, able to be added to, and logical (for computer capability) (Driscoll, 1984 and Henderson & Davis, 1978). Finally, some add the ability for the units to be identifiable on the ground, not just on a map (Driscoll, 1978, p. 156).

When to Integrate

One possibility for timing of integration is at the beginning while setting criteria (Lund, 1978, p. i). Pulford, 1978, p.140 suggests the combination should be done before the inventory process. This timing in essence creates a whole new system.

Another place to perform combination is during the inventory process or combining the results of previously used classification processes for resources under consideration (Hamilton, 1978, p. 137).

Integration techniques

"Integration is not a matter of mixing up" but a careful consideration of the mix of parts (Zonneveld, 1981, p.76). Each individual resource system has merits, weaknesses and reasons for existence. Understanding the importance of the parts (the individual systems), allows for greater understanding of the whole (the integrated system). An assortment of techniques is available for the integration of classification systems. Possibilities include modeling, assignment of importance value, map overlay, and the use of a matrix or diagram. The purpose, or timing of integration, determines in part the process used as does the selected systems. Definition and description of some commonly used integration techniques follow. Most are adaptations of mathematical quantitative techniques devised to look at relationships.

> _model_. This process defines a system to divide the land based on all the resources and uses. Goals, for the site and all resources, are set at the beginning, as are the rules devised for use of the model.
>
> _matrix or diagram_. This technique has been used by Driscoll and others (1984), and McHarg (1969). A matrix is a rectangle or square with divisions in each direction. Across the top is one item under consideration, and down the side is the item for comparing (Maxwell, 1977). Comparison is made of resulting classification from two to many systems, where any class of any system can cause others to change. The final result is a single set

of zones, formed from all systems. Usually comparisons are made two at a time. It is a form of comparative judgement (Dunn-Rankin, 1983).

overlay maps of results. Also been used by Mcharg (1969), this technique allows the use of many resource systems. All can be considered at the same time; systems can be used in a specific order, or with one considered as a modifier.

rules of combination. In an attempt to avoid the sometimes arbitrary assignment of numbers, rules of combination are used. This process is similar to the assignment of an importance value, in that each resources is defined or ranked. As each new system is added to the results of the previous combination, a new set of zones is created. Each system can be considered with equal importance in a predetermined, specific order, or the addition of one to a zone can negate the effect of another. These decisions are made before integration.

modifier. The basic division scheme of one is employed, with another creating variations to an otherwise homogeneous zone. This technique, a kind of "rule of combination," can be used in conjunction with the overlay process.

use of importance values (or weighting). All systems are applied, each given importance based on, for example, its quantity in an area or susceptibility to damage. There are no definite answers to setting values. Judgments must be made using, in part, management objectives, to determine what resource or use has more importance in a specific situation. An attempt is to be as objective as possible. However, limits to pure objectivity are recognized (Hammond and McCullagh, 1978).

Combined Classification Systems of Other Managers

Several endeavors have produced combined environmental resources to form an integrated system of classification. In these integrated systems, the environment is approached as an ecosystem (elemental natural resources-- *i.e.*, soils, wildlife, and vegetation are viewed not as single entity, but as an inexorably intricate, interwoven complex interaction). Bailey describes ecosystem concept as one in which the

> earth operates as a series of interrelated systems within which all components are linked...stresses the interrelationships among components rather than treating each one as a separate characteristic of the landscape" (Bailey, 1981, p. 97).

Outlined below are some that use natural resources in their process of classification.

ECOCLASS & ECOCLASS modified. The purpose of ECOCLASS is to "link existing disciplinary classifications of the major ecosystem components" for land use planning (Corliss, 1973, p. 265). ECOCLASS combines land, vegetation, and aquatic systems to map the vegetation of an area. Land units from existing classification processes are combined; land, vegetation and water features are given equal weight. Computer software programs are a part of the process. Multi-use requirements and a need for interdisciplinary cooperation precipitated the creation of ECOCLASS's (Corliss, 1973; Ellis, *et al*., 1977; and Buttery, 1978).

Ecological inventory. Often attributed to McHarg, this system is for design and land use planning. It evaluates the potential of an area for specific uses. The approach is ecological and considers the interactive nature of the environment. Hundreds of resource maps, as well as those of natural phenomenon and processes, and unique features, are created. Unique features may be cultural or natural. By overlaying the maps, specific sites can be determined to be "intrinsically suitable" for specific uses (Steiner, 1980, p. 15). To exemplify the idea of multiple use, a three-level matrix compared these land uses with all other land uses, and the natural components. Finally, the environmental consequences are considered, as land resources are seen as scarce.

While very complete, the entire process can be seen as time consuming (Steiner, 1980; Redding, 1973; McHarg, 1969; Gold, 1980; & Belknap & Furtado, 1982).

Ecosym. Ecosym is used for wildlands and the purpose is to provide quantifiable information that would enable the predictions for impact to the ecosystem be mapped. Ten natural resource components, some classified using existing systems, form the foundation of the system. The emphasis is on physical characteristics and not location or spatial arrangement. Integration is accomplished by using a set of algebraic-like formulas. The developers of the system do not call it an integrated system because the manager is the one who mixes the results of the resource classes according to his/her need, but it meets criteria to be what others call an integrated classification system (Ellis, 1977 and Henderson & Davis, 1978).

Metland. Metland (Metropolitan Landscape Planning Model) combines natural resources, and land requirements/ land use with a socio-cultural resource. In the words of its originator, it has "attempted to interpret and synthesize the best available landscape data and existing procedures" (Fabos & Caswell, 1976, p. 3). The scale of the Metland study is town or small region, and its purpose is to quantify environmental resources to determine impact and show consequences of urban growth. It makes use of computer mapping and mathematical procedures. The framework is a three-phase model (assessment, evaluation and implementation) with existing classification system integration taking place in the assessment phase.

The resources (called variables) are classified according to some existing system and then combined with another related resource systems. Relationships could be one as an integral part of another, such as soil type a component of wildlife habitat. After suitability values are assigned to each grouping, they continue to be overlaid, compiling suitability ratings, and result in a monetary value being placed on the resources.

Michigan's Department of Natural Resources Plan. The plan permits analysis of management strategies as they relate to impact caused by various forest resource management options. It resembles a compiled and spatially related inventory more than an actual integrated systems. However, it adapts part of more than one system. Several natural resource systems, and two kinds of recreation opportunities and timber, as a monetary resource, are employed. Six base natural resources are inventoried, classified in ten-acre grids and computer stored. Demographic and infrastructure information is overlaid on each grid. Other resources are inventoried independently, allowing for combination as specific needs arise. All resources are tied to the basic land data (Rose, 1978).

Other Systems. Land Systems Inventory (Wertz & Arnold, 1972) include combinations of natural resources or are partially integrated systems. Others are of a similar personality and process. Many are in response to legislation (*i.e.*, NEPA, National Environmental Policy Act; NFMA, National Forest Management Act; and Federal Land Policy & Management Act) which advance either multiple-use planning or accountability to the environment for management activities.

On a larger scale are division systems developed in 1976 by Bailey (1980), by Anderson and others (1976). Bailey (1980) uses geographical spatial patterns and ecological resource properties. His ecoregions are built using the components of temperature, rainfall, vegetation and soil. Each ecoregion has interaction among distinctive plants animals, landform climate, vegetation, and ecological climax.

The system developed by Anderson and others (1976) was in response to interagency needs. It is compatible with remote sensing data, is intended to be open ended and defines land uses and land cover. Land-use as defined here is natural resource related, not human use oriented. It included features or parts of other systems. Nine classes of land use/ land cover are specified at level one. Three other levels at smaller scales subdivide each class, often using the definitions and classes of existing agency classification system, such as wetlands or forest land. For a discussion and comparison of large scale terrain classifications see Ollier (1977).

Moss (1986) takes a different approach and uses biological process (*i.e.*, energy input and primary production) as the basis for his classification system (Moss, 1986).

A model developed in the 1970's has assessment as its reason for classification. This model integrates visual-cultural and natural components of the landscape by superimposing the human-made or human-manipulated on the natural system. Nine landscape units and seven landscape series results to determine the quality of the landscape and ultimately decisions based on the quality of the various classes. The application of this model to two large regional sites is described in Riotte, Fabos and Zube (1975).

Chapter two has described in some detail classification principles and organization. The next subject was an explanation of system integration and criteria for integration followed by the integration efforts of others. The National Park Service, providing and managing recreation and using resource classification, was also discussed.

Chapter three will describe the process for gathering of information, the procedure used in selecting systems and a method for integration of resource classification systems in preparation for the case study of the Blue Ridge Parkway.

CHAPTER THREE: METHODOLOGY AND PROCESS

Part I: RESEARCH INTENT, DESIGN & METHODOLOGY

Chapter one introduced the importance of leisure, and emphasized recreation as a form of leisure. The intent, focus, and significance of this study was stated. A survey of the literature was contained in chapter two. The emphasis was on an understanding of classification and classification vocabulary. Classification system for resources and the concept of integrated systems set the framework for the study. At this time, the methodology will be explained. The intent of this research is to show the possibilities and practicality of integrating existing resource classification systems to meet park goals.

Based on the literature, a process is described for park managers to determine resource systems and the techniques for combination. A step-by-step procedure is used to integrate resource classification systems for use in multi- resource recreation areas.

A case study will test the process. Case study as a research tool, has three functions: (1) confirm a hypothesis or research intent, (2) clarify or prove wrong a hypothesis, or research intent, or discover a new hypothesis, and (3) to understand relationships, the parts to the whole (Sjoberg and Nett, 1968). The use of a single case to test an assumption permits a situation that is within the grasp of a single research project, after which one can then generalize about the whole or additional case conditions. The hope in this study is to choose a case that is normal and aids in the clarifying of the hypothesis, rather than choosing a deviant case to "falsify ... propositions" (Sjoberg and Nett, 1968, p. 260). An additional wish is to lend understanding to a process in development. The Blue Ridge Parkway in North Carolina and Virginia provides the case study.

Part II: PROCESS

INTRODUCTION

The following procedure is used in conjunction with the system Description Form (see Fig. 3.01: Sample Description Form), and the system comparison questions to formulate a methodology for integration of existing classification systems, for a specific recreation area. This process relates system description and evaluation, integration techniques description and criteria (from chapter two) to check the final integrated system. The following tasks are a description of the decision-making process.

TASKS

Task One: Determine or extract purpose, goals, and assets of park.

For productive use of integration, each park manager must be aware of the goal and assets of the park, and the potential utilization use versus preservation conflicts. Possible management goals could be allocation, maintenance and law enforcement, visitor use and interpretation or allocation of resources and money. The decision is made in part by the Statement for Management, the legislative act creating the park, public input, visitor surveys, site analysis or manager experience. Additional information might include the type of experience visitors require or management wants them to have. Clear clarification of management goals in the form of a list of resources, needs, and objectives is the outcome of this task.

Task Two: Select and describe potential existing systems based on goals and resources of recreational area, defined in step one.

Each individual system is described, as can be determined from literature or previous management knowledge, according to a set of characteristics. Using the same characteristics enables evaluations to be comparable. In addition, the format for explanation of all systems is the same: a brief objective or goal statement; a background section; an explanation of procedure section; and a review section.

The goal/object section. While good management practices are the ultimate goal of every system, each is defined for a specific reason, tied to its resource. The object is the end point the way things are to be and the goal is the aim or motivation for getting there. Some systems have a principle and a secondary intent.

The background section. In the background section is the description of the rationale, or approach taken, for development of the system. Determination of need is another issue discussed. Other characteristics are the scale of use, form of management, and classification taxonomy.

The procedure section. This section describes the framework of the system, providing the type, amount and manner for collection of data needed in the formation of each system. Also included are the elements (components) that make up each system and the process used to blend them. The steps performed to arrive at the final classification are outlined.

The review section. Related in the review section are advantages, disadvantages, further uses, relationships to other systems, and comments as to the ability of a system to meet its own goals. Ease of evaluation and straightforwardness will also be described in this section.

Use Of Descriptive Form

A Description Form (see Fig. 3.01: Sample Description Form), utilized for visual ease, highlights the essence of the characteristics of each system, drawn from the descriptions. The numbers beside the definitions of characteristics in Figure 3.01: Sample Description Form correspond to the numbers on each form. Listed across the top of the form is the system name. Down the left side are the goal or intent and other characteristics. Putting all the complete description forms together side by side allows comparison of the goals and characteristics of each system to every other system.

CLASSIFICATION SYSTEM NAME:

(1) GOAL/ OBJECT: The intent of each system.

(2) METHOD/ PROCESS: (ie. overlay) The physical way to make decisions for class divisions.

(3) TYPE OF CLASSIFICATION:
This lists the principles of classification as discussed in a previous section of this chapter. They define the method used to create classification systems. There are two choices in each of four categories.
a) subdivision OR aggregation
b) natural (multi) factor OR single factor
c) hierarchical (fitted multi-) level OR single level
d) monothetic (related by similarity) OR polythetic (related by relationship)

(4) SCALE:
Scale refers to the spatial size of the area of resulting classes. The range for this characteristic is from site specific on the small end and regional on the other.

(5) KIND OF INFORMATION: This is the nature of information collected.

(6) MANNER OF COLLECTION:
The way of gathering information about a resource. Examples would be remote sensing or site visits

(7) COMPONENTS:
the elements that are manipulated to arrive at resulting classes

(8) RESULTING CLASSES:
The names of the divisions.

Figure 3.01: Sample Description Form with definition of terms. (Source: the author).

This is the form to be used when describing characteristics of the systems selected for combination for a park. Definitions are given beside each term and the number corresponds to completed forms (Figs. 4.07: Description Form for Recreation Opportunity Spectrum, 4.08: ... for Visual Resource Classification, 4.10: ... for Culture Preservation Classification, and 4.12: ... for Ecological Land Classification Framework.)

Basis for Characteristics

There is support for extracting certain information and characteristics from the description of the resource systems. Stating the goal helps clarify the system and match it to an important resource for a specific park. Information needed for using one system might be the same for another. In addition, answers to the questions provide information needed to match systems to techniques, as techniques are described in part by information used. The elements used in the procedure of each have the potential to suggest an integration technique to be used or determine which systems are compatible. The resulting classes of a system might suggest which integration technique could be used, matching classes to technique requirements.

Task Three: Compare resource classification systems (selected in step two).

Comparison of the selected systems is aided by characteristics drawn from descriptions and highlighted on the Description Form. The comparison is accomplished by asking a series of questions. Answers to the question suggest technique or order of integration. This list is not exhaustive, but a solid start for links between characteristics of systems, other systems, and integration techniques. The numbers by questions tie them to the characteristic number on the Description Form (see Fig. 3.01: Sample Description Form).

(3) TYPE OF CLASSIFICATION

(a) Aggregation is formed from many parts and subdivision becomes many parts. Where any system has a component that is a part of another, this can become a point of beginning for integration.

(b) If any factors of those that are multi-factor, see (8 Resulting classes).

(c) How many are hierarchal? Those that are tend to be more compatible, at a variety of levels. The non-hierarchical ones may only apply to a "final" class.

(4) SCALE

Are all the same scale? If the answer is no, they are not as likely to be applied at the same time.

(5) KINDS OF INFORMATION

If any use the same information, a single set of criteria or components could be devised to divide the site. Or steps could be combined. If a system uses the same type of information a technique does, chances are they can be used together.

(6) MANNER OF COLLECTION

(7) COMPONENTS

Are any components used to form their classes the same? Or do any use other systems as one of their componential parts? If so, one could be divided and used to form the other.

(8) RESULTING CLASSES

Are any of the resulting classes the same or similar? If they are then mesh them at the same time. If not, then use a different approach or technique for each, at different times

Task Four: Select integration technique, based on results of system comparison in task three, with the techniques of integration (defined in chapter two), management objectives and results wanted (determined in task one). Implement.

Decisions are made appropriate to chosen systems, management objectives and the results wanted. Review the various procedures for integration of systems (In this study, they are listed and defined in chapter two.)

A methodology for the description, selection, and integration of classification systems for recreation areas was enumerated in this chapter. A narrative description of each selected system follows the same format using the same set of characteristics which are shown visually and emphasized in a description form. Selection of systems to be used is performed by managers, who base their decisions on park goals and resources, and on research, public input, and prior experience.

The next part of this thesis is to apply this decision-making process to the case study, the Blue Ridge Parkway. Chapter four is the case study for this research and applies the process outlined above to the Blue Ridge Parkway. The process will determine what would be an appropriate classification scheme for the Blue Ridge Parkway. Prior to the application, a history of the Blue Ridge Parkway will be included and a listing of its assets, resources and management objectives.

CHAPTER FOUR: CASE STUDY

INTRODUCTION

Chapter three described the methodology for this study and the process for selecting and integrating classification systems for a recreation area. The process described a way to combine classification systems. Now the tasks detailed in the process will be applied to a case study, the Blue Ridge Parkway.

THE BLUE RIDGE PARKWAY

History

The history and linear quality of the Blue Ridge Parkway (BRPW) makes it unique among recreation areas, and parks. President Franklin D. Roosevelt's first act as President was to sign a bill providing money for projects including the parkway.

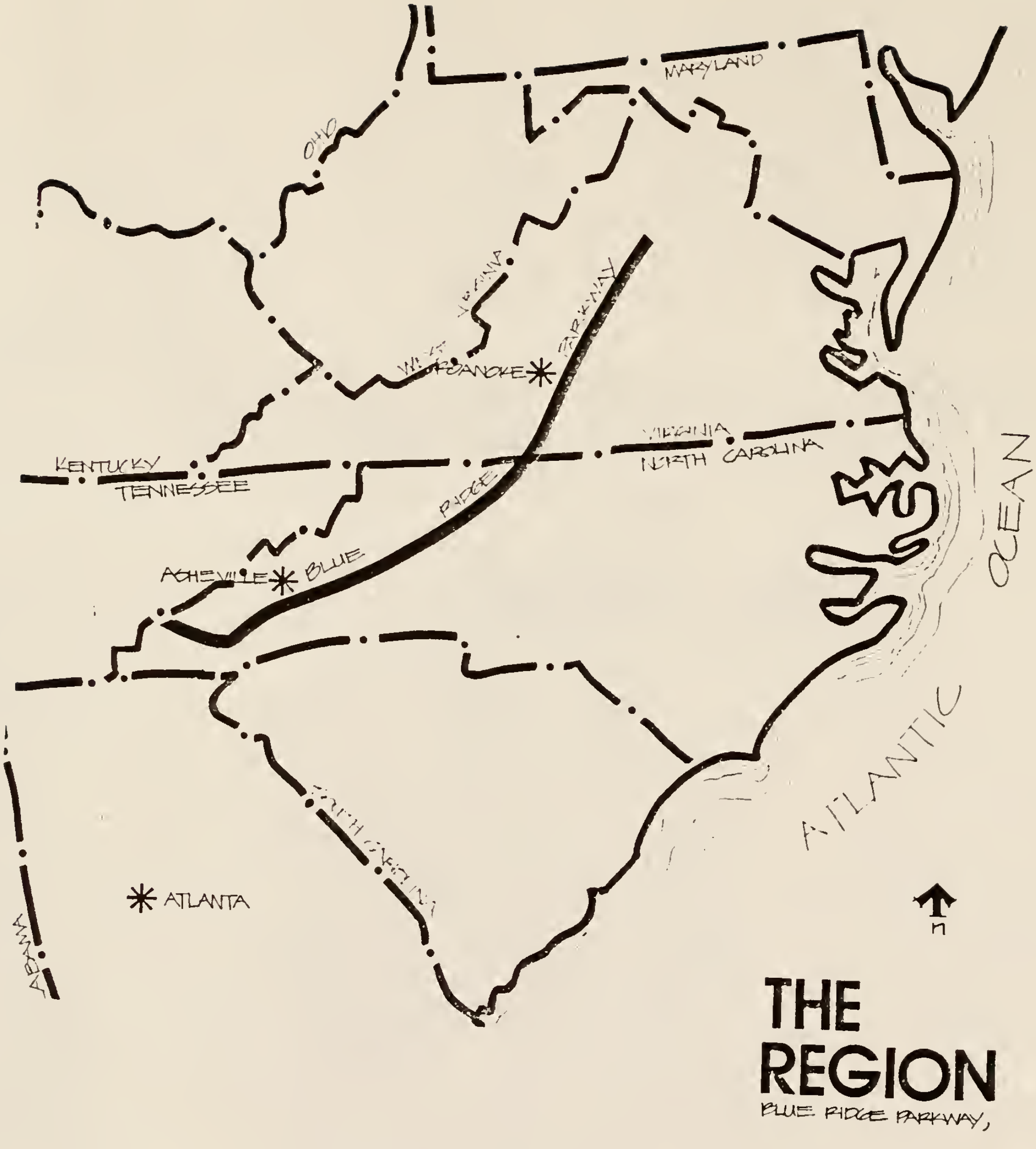


Figure 4.01: Location of the Blue Ridge Parkway

The Blue Ridge Parkway is a 469-mile road connecting Shenandoah National Park in Virginia to the Great Smoky National Park in Tennessee. (Source: National Park Service, 1976)

Figure 4.02: Examples of recreational opportunities along the Blue Ridge Parkway.

This picture shows two examples of recreation, hiking, fishing. (Source: Peaks of Otter brochure, date unknown).

The goal was to provide a scenic drive through North Carolina and Virginia (see Fig. 4.01: Location of the Blue Ridge Parkway) connecting the Shenandoah National Park in Virginia to the Great Smoky National Park in Tennessee. It was to be a ribbon conveying people through the cultural and historic landscapes of the five mountain ranges making up the Southern Appalachian Highlands. The park runs in a generally northeast-southwest direction; the highest point at 6053 feet is near the Great Smoky Mountains National Park at the southern end. Recreational opportunity (see Fig. 4.02: Recreational opportunity along the Blue Ridge Parkway), education and preservation of its resources were additional reasons for its development.

Actual work on the 469-mile parkway, an extension of the popular Skyline Drive in Shenandoah National Park, was begun in 1936. None of the building of the road was routine; in places the technological aspects of construction were pioneering (see Fig. 4.04: Representational cross section). Although early labor was supplied by untrained WPA workers (Works Progress Administration, providing work for the Nation's unemployed during the depression), the first two-thirds took seven years to build. The rest was over thirty years in the building. Environmentalists, World War II and surrounding landowners with complaints were responsible for the delay. While the majority of the parkway was completed in the 1950's, the final phase, around Grandfather Mountain, North Carolina, was completed in 1983.

The emphasis was on park, not highway. For that reason, stops were created every thirty miles for rests at scenic overlooks. Overlooks number nearly 250 (see Fig. 4.03: Scenic overlook on the Blue Ridge Parkway). Every sixty miles an overnight stop was provided. Twelve of the wayside stops became state parks.

Figure 4.03: Scenic overlook on the Blue Ridge Parkway.

Stops along the way encourage visitors to slow down and enjoy the natural and visual resources associated with the area. (Source: photo by the author, 1988).

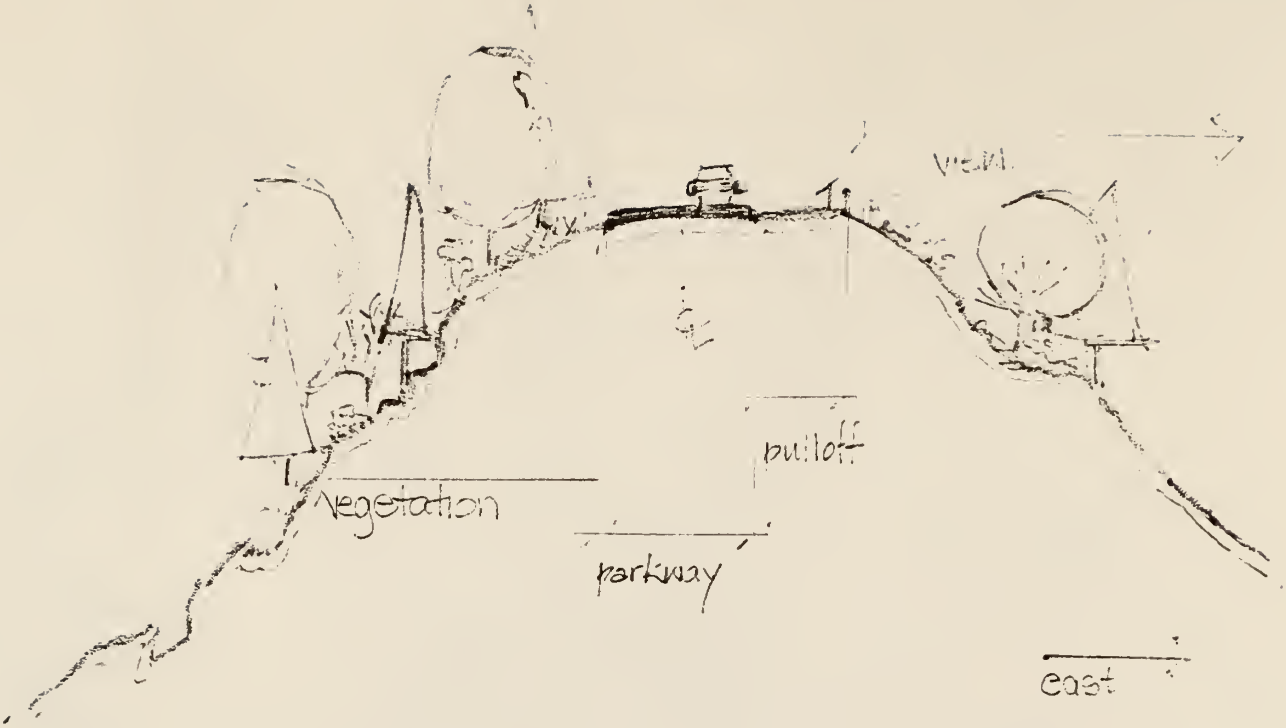


Figure 4.04: Representational cross section of Blue Ridge Parkway showing the road- topographic relationship.

Much of the land the road cut through was damaged by overuse. One of the goals was to restore the vegetation and original nature of the landscape. Stanley W. Abbott, a landscape architect, is credited with this restoration and creation of the parkway (Jolley, 1985). Abbott did the site analysis as well as supervising the crew, the route layout and the actual building.

The parkway was first called "The Scenic." The views were its greatest asset. The drive was to be one through rural America. The park has always had a mission to preserve, reclaim and provide scenic vistas (Jolley, 1985, no page numbers).

Current Status and Resources

A description of the park today would present much the same picture as in the past. The park continues to provide a leisurely drive along mountain ridges and river valleys and their surrounding countryside, displaying natural beauty, and historic and cultural resources.

Access to and from adjacent property is limited and commercial traffic is prohibited on the parkway. The attempt is to provide the illusion that the park boundaries are unlimited, including all land to the horizons.

Recreational opportunities, another aspect of the importance of the park, include hiking, biking, picnicking, sight-seeing, camping, and educational activities planned at visitor centers.

Special problems, that impact the mission of the park, are encountered by management. Some of these issues are developmental encroachment, forest decline, air and water pollution, incompatible adjacent and view-shed land uses, and increased use (17,000 visitors in 1986, NPS, 1986, p.11).

On recent trips to the BRPW, a team from the National Park Service Denver Service Center, in the process of writing the General Management Plan, held scoping workshops with local experts on issues important to the parkway. Expressing their opinion were culturalists, and naturalists (National Park Service, 1988). In addition, NPS interpretive specialists created interpretive stories for use along the parkway based on meeting results. For the most part, suggestions, opinions, and views of the cultural and natural professionals were compatible with each other. Opinions at the workshops held for cultural resource discussion were of two types. One is to include the role the parkway had in development and continues to have in the area and its people. The other area is the request for more realistic interpretation (and more interpretation in general) of the culture of the various groups represented in the area (see Fig. 4.05: Puckett cabin). One comment offered the comparison of the parkway as a living museum with the same responsibilities for accuracy and fairness as any other museum.

Central issues for the natural resource experts were (1) protection and (2) interpretation and education of the natural aspects of the region. Protection was advised for local and rare wildlife species, and the diversity of the area. Encroachment, incompatible use or over-use at specific sites, were causes for concern (see Fig. 4.06: Example of Blue Ridge Parkway vegetation).

These issues represent the purpose and resources of the parkway, supporting choice of systems to be used and where divisions are to be made (especially in the case of specific comments from naturalists) once systems are selected.

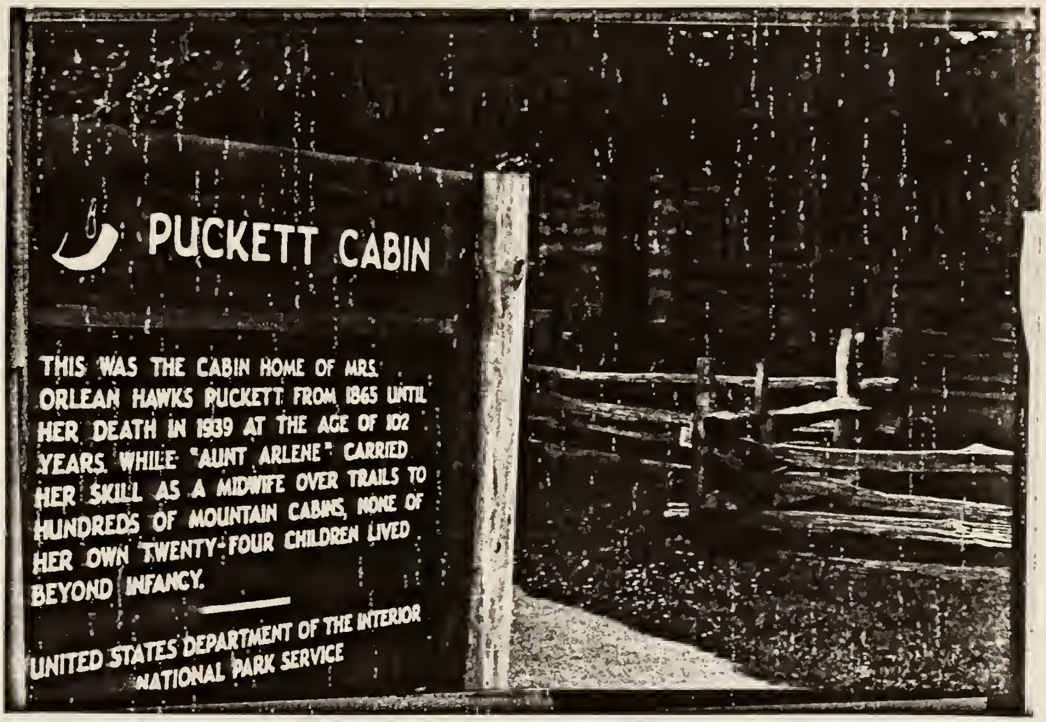

PUCKETT CABIN
THIS WAS THE CABIN HOME OF MRS.
ORLEAN HAWKS PUCKETT FROM 1865 UNTIL
HER DEATH IN 1939 AT THE AGE OF 102
YEARS. WHILE "AUNT ARLENE" CARRIED
HER SKILL AS A MIDWIFE OVER TRAILS TO
HUNDREDS OF MOUNTAIN CABINS, NONE OF
HER OWN TWENTY-FOUR CHILDREN LIVED
BEYOND INFANCY.
UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

Figure 4.05: Puckett cabin.

This cabin is an example of a cultural/ historic element. (Source: photo by author, 1988).

Figure 4.06: Examples of Blue Ridge Parkway vegetation.

The photo on the left is a panoramic view of vegetation and the one on the right is a closeup example of vegetation. (Source: photos by author, 1988).

Current Division Schemes

Like other units within the National Park Service, the BRPW is divided into four zones: natural (with associated sub-zones), historic, development, and special use. The zoning emphasis is on land use and maintenance. The 1976 General Management Plan also delineates four districts for development purposes (National Park Service, 1976). For maintenance and other purposes, the park is described by mile markers and the number assigned to concrete "pours" when building the road. By virtue of existence in two states and many local jurisdictions, additional division is political and legal in nature.

APPLICATION OF THE INTEGRATION PROCESS TO THE BLUE RIDGE PARKWAY

As introduced in chapter three the tasks will now be applied to the Blue Ridge Parkway (BRPW), supported by information in the preceding section.

Task One: Determine or extract purpose, goals, and assets of park.

The original function, and original purpose, was to connect two national parks. The goal then, as now, is to provide recreation and a leisurely drive through a representative part of the Southern Appalachian Highlands. As expressed in the draft of the Statement for Management (SFM) (National Park Service, circa 1987), the parkway is spectacular scenery, unique beauty, unusual geology, outstanding natural features, unique recreational values and resources, and historic period structures. Assets of the BRPW are its views of natural phenomenon and cultural features. A special feature of the parkway, its linear quality, is taken into consideration.

Task Two: Select and describe potential existing systems based on the goals and resources of recreational area, defined in task one.

Selection of classification systems for the study are based on assets of the park as determined in step one. The legislation, National Park Service, and local experts defined the BRPW by its cultural and historic resources, natural resources, and its recreational aspect. Therefore, the systems selected to be integrated for the parkway represent these resources and use. Classification systems by name and origin are Recreation Opportunity Spectrum, as employed by the United States Forest Service (USFS, circa 1979-1982); Visual Resource Management, used by the Bureau of Land Management (BLM, 1986); a cultural identification and preservation system, developed for the National Park Service (NPS) (Melnick, 1984); and Ecological Land Classification Framework, evolving for multi-agency use (Driscoll *et al.*, 1984).

Each of the systems is described below in the same format. Then salient points are filled in on a description form, as described in the process section. (see Fig. 3.01: Description Form) and later all four forms are aligned side by side, for comparison of characteristics.

RECREATIONAL OPPORTUNITY SPECTRUM (ROS)

GOAL/OBJECTIVE

The classes developed are to facilitate the providing of diverse settings for quality recreation experiences.

BACKGROUND

This background will provide a combination of theory and practical application of the Recreation Opportunity Spectrum as each agency, Bureau of Land Management and United States Forest Service (USFS) utilizes the basic ROS concept with name variations for the classes as well as the determinants to classifying along the spectrum.

The basic underlying principle, rooted in psychological theory, is that people seek a certain activity in a preferred setting to obtain satisfactory experiences (Driver and Brown, 1978 p. 24). Managers provide settings, not experiences.

Developed in the 1970's, during a time of multi-use concept awareness, the system attempts to put recreation into the formula for multiple land use management planning (Driver, *et al.*, 1987, p. 201).

The three dimensions of recreation preference are: activity opportunities, setting opportunities and experiences opportunities (Driver *et al*., 1987, p. 204). Experience opportunities are what is ultimately demanded. It is largely resource-based, with setting as the variable under a manager's control (Driver, *et al*., 1987, p. 41). The physical settings are a "combination of physical biological, social and managerial conditions that give value to a place" (Clark & Stankey, 1979b, p.1). The Recreational Opportunity Spectrum is a single level, multifactor, and polythetic system employing subdivision. It can be used from site-specific to regional scale.

PROCEDURE

The specifics used by the United States Forest Service will be used here (United States Forest Service, circa, 1979-1982). Opportunities range along a continuum of several components from primitive at one end to urban at the other (see Fig. 4.07: Classes for the Recreation Opportunity Spectrum). No judgement of quality is made in any class of opportunities as good or bad experiences can result in each (Clark & Stankey, 1979a, p. 14). Indicator factors, criteria used to place each component along the spectrum, are described below. These factors were selected based on specific goals for the factor. Requirements for the factors were related: to the manager, that they be under his control; to the user, that they relate to preference and affect their choice about areas; and to the character of the factor, that it is measurable, observable and shows a range of conditions. The criteria (indicator factors) are related to the setting component: the first three to the physical, the next to social and the last to the managerial. All factors are relative-- what is acceptable in one class may not be accepted in another.

> Recreational Opportunity Spectrum Indicator Factors
>
> remoteness
> The closeness of human sights and sounds explain the experience of social interaction to varying degrees. Identified by the distance from roads, railroads, and trails.
>
> size
> The primitive and semi-primitive classes have acreage requirements, while the other three have none.
>
> evidence of humans
> Visitors impact natural resources and each other's space. Each opportunity class has its own level of acceptable impact. Naturalness of the setting, evidence of roads and structures determine this aspect of the setting.
>
> user density (social setting)
> This is the distribution (frequency of interactions), not the number, of users in space and time. Interaction is aided by natural variations and management policies.
>
> managerial regimentation & noticeability
> Modifications are appraised using variations of four elements (Clark, and Stankey, 1979a). The elements are the extent, the visibility, the complexity of the modification, and

facilities. Each class has techniques of control (restriction) that fits with the opportunities supplied. The techniques are regulations, rules, site design and laws.

The factors and their criteria, are mapped, along with existing conditions, and structure, then placed in a chart for comparison (see Fig 4.07: Classes for the Recreation Opportunity Spectrum), resulting in a range of acceptable conditions divided into one of the six opportunity classes. The divisions between each class are not hard and fast. The names and numbers of classes can vary, judged by professional and user knowledge, and public involvement (Clark & Stankey, 1979, p. 14). Individual natural features (landform, vegetation, water, wildlife, and scenery) are not rated as any combination of natural features is believed to be compatible with any opportunity class. The resulting classes along the spectrum are; 1) primitive, 2) semi-primitive--non-motorized, 3) semi-primitive---motorized, 4) roaded natural, 5) rural, and 6) urban (United States Forest Service, circa 1979-1982).

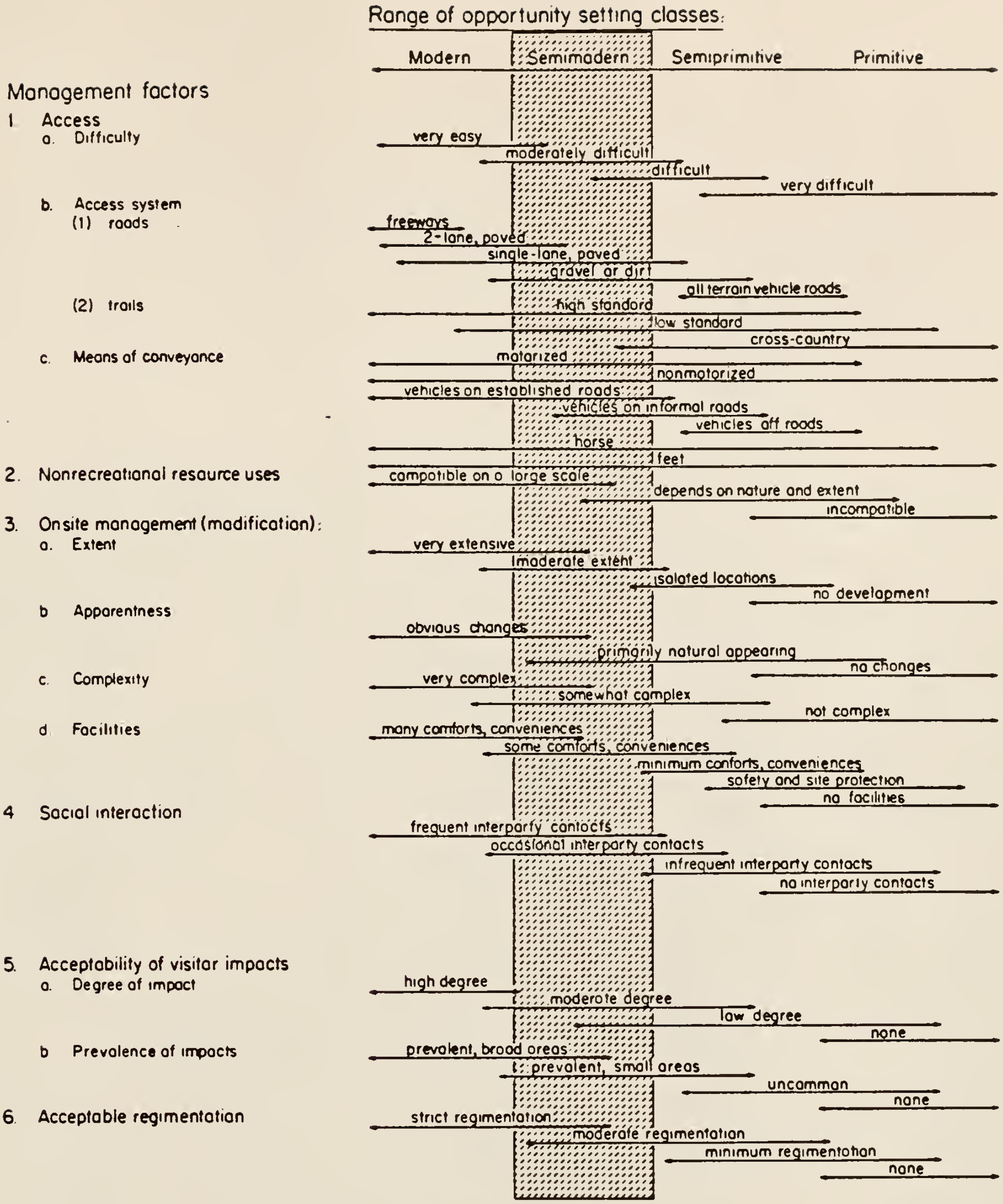


Figure 4.07: Classes for the Recreation Opportunity Spectrum.

Across the top are the range of classes, based on criteria for each component. On the left side are the components, with the criteria under each class. The shaded area shows acceptable combinations for semimodern opportunities. (Source: Clark & Stankey, 1979, p. 15).

REVIEW OF RECREATIONAL OPPORTUNITY SPECTRUM CLASSIFICATION SYSTEM

Other inventories and classification system are being developed using Recreational Opportunity Spectrum as a basis (Brown *et al.*, 1978, p. 73). Determining impact, an important component for preservation and maintenance of recreation areas, is possible using the Recreational Opportunity Spectrum rather than relying on the concept of carrying capacity. One criticism is that the Recreational Opportunity Spectrum is simplistic in nature. Another is that it is derived from other disciplines and needs researching in a recreation context (Driver, *et al.*, 1987, p. 210).

Care must be taken to select appropriate development in an opportunity class, as a change away from class criteria, would create another class. The result would be less variety in a particular recreation area, which is not the intent. See Figure 4.08: Description Form for Recreation Opportunity Spectrum.

CLASSIFICATION SYSTEM NAME: Recreational Opportunity Spectrum (ROS)

(1) GOAL/ INTENT: To provide diverse settings for quality recreation experiences.

(2) METHOD/ PROCESS: Individual components are mapped and summed in a chart, their criteria set along the spectrum.

(3) TYPE OF CLASSIFICATION:
a) subdivision
b) multi-factor
c) single level
d) polythetic

(4) SCALE: site-specific to regional

(5) KINDS OF INFORMATION: Each component has a range of conditions; all observable, and measurable.
a) activity: setting provides appropriate activity opportunity (*i.e.*, isolation, large group)
b) setting: physical (natural, cultural/ historical), social (behavior, equipment, pets) managerial (laws, policy)
c) experience: user brings (*i.e.*, motivation), experience opportunities are a function of the setting and continuum classes

(6) MANNER OF COLLECTION: user information is from surveys and comments, judged by professional and user knowledge, and public input

(7) COMPONENTS:
1) remoteness
2) size
3) evidence of humans
4) user density
5) managerial regimentation and noticeability

(8) RESULTING CLASSES: Are in a continuum, a) to f).
a) primitive
b) semi-primitive--non-motorized
c) semi-primitive--motorized
d) roaded natural
e) rural
f) urban

Figure 4.08: Description Form for Recreation Opportunity Spectrum. (Source: the author).

CULTURAL LANDSCAPE CLASSIFICATION

OBJECTIVE/ GOAL

The rationale behind classifying cultural landscapes is to protect them. This classification provides for planning of cultural landscapes.

BACKGROUND

"Although a useful tool, visual resource management does not address the complexity of cultural and historic meaning in a landscape" (Melnick, 1984. p. 5). Preservation of cultural landscapes is given credibility for a variety of reasons. They include:

1) link to the past.

British historian W.L.H. Hoskins says, "the landscape... to those who know how to read it.. is the richest historical record we possess (Tischler, 1982, p.91)." J.M. Houston, a geographer, contends the landscape reveals the social and economic history of a region (Houston, 1971, p. 159). These vernacular (not prominent sites, *i.e.*, Mt. Vernon) landscapes are important to describe the common man and how the variety or melting pot of our country has developed.

Upon investigation of these landscapes, other things are revealed about our roots, including the social and economic aspects of life or the psychological make up of the people who once lived there.

2) pride or national identity.

History can come alive for those who visit these sites. We as a people can take pride in how far we have come and the obstacles we have overcome. We can identify with each other and see the difference between the USA and development of other countries.

3) for the personal growth and satisfaction they bring.

These landscapes are special places to go. Setting them aside creates open space which is comforting and psychologically necessary. Places set aside are often in the rural areas and Marion Shoard goes so far to say we have an "affection for country side" (Lowenthal & Binney, 1981, p.84).

Cultural landscape preservation is a relatively new part of the preservation field and combines aspects of several disciplines including geography, planning, landscape architecture and preservation/history. R. Z. Melnick, developer of the classification system for the National Park Service (NPS), views the job of cultural preservation as a combination of landscape architect, usually concerned with new design, and the historic preservationist, whose dominate concern has been architectural structure preservation (Melnick, 1983, p.xi).

Both words in the phrase, cultural landscape, have the potential to represent many ideas. "Cultural" describes anything from anthropology to opera. Cultural is used more often than other words, such as vernacular or common. Over time, the words cultural and landscape have generally been accepted as the best description of special landscapes, dominated by evidence of human activity.

PROCEDURE

Steps in the rural historic district classification and planning process (Melnick, 1982 & 1984) are as follows:

1) Identify potential site or areas to be classified as historic. In the preliminary identification stage, localities are classified as being significant or not and the degree of integrity.

2) Identify and record component part. After the significance of a landscape to the area and history is established, steps are taken to identify and record the component parts individually and as a composite. A case could made to increase the ten basic components to twelve or more, as cemeteries could be an independent category and land use can be further subdivided. The 10 basic components are:

1) overall patterns of spatial organization
2) land use
3) response to natural features
4) circulation
5) boundary demarcations
6) vegetation related to land use
7) cluster arrangement
8) structures
9) small scale elements, such as grave markers
10) view or perceptual qualities

The landscape architect, historian or planner must decide the techniques to be used to discover these patterns and the best way to document these components. Photographs or maps could be used, as well as books, historic documents, and documentation during a site visit.

This information is recorded in a Cultural Landscape Report (CLR). The resulting classes are an interaction of the attributes and qualities of the components in context, with consideration of physiography, ecological, and historical/cultural. A historical area is defined by natural, political and cultural boundaries. The classes to be evaluated for significance are 1) rural historic district, 2) historic site, 3) historic building, 4) historical structure, and 5) a historical object.

A rural historic district can be determined, in part by integrity, context, and significance. The criteria of the National Register for Historic Places is also used.

3) Evaluation.

An individual component, of itself, is not more important than any other and some sites do not have all pieces. Evaluation of setting, history, inter-relationship, and composite results is what identifies one region from the next determining quality. The results form a composite map which clearly identifies the historic district.

4) Management.

The last step is selection of an appropriate way to manage the cultural landscape. Management should be according to guidelines to fulfill goals established in a previous step.

The scale of this system can be from local to regional. This system is multi-factored, single level, polythetic, and aggregated.

REVIEW OF CULTURAL HISTORICAL CLASSIFICATION SYSTEM

Hoskins feels determining what is significant or merits preservation is difficult (Tischler, 1982). Until standards are set, used and agreed upon, it is a question of who will decide the level of preservation.

In addition, landscapes possess qualities that create additional problems in preserving. A landscape of any kind is not a single entity but a complex structural, organic, and cosmic whole (Kane, 1983, p. vii). The landscape is dynamic, the parts constantly changing, making it unique. At no point is the landscape finished.

One problem in restoration is understanding the original intent. Less documentation exists for landscapes, as it does for historic structures often represented by floor plans. An additional concern is the decision as to a time period for preservation and the necessity to prevent further change. Melnick discusses determination of integrity to find value and justify the use of historical (1984, p.39). This author feels integrity could be at another level, not just determining the integrity of evidence left (an evaluation function) but also the degree or level at which historical evidence is to be maintained (an administrative function). Fitting the old to the new is a consideration in preserving and making a site ready to be used. These landscapes weren't designed to fit the needs of the visitor of today with new requirements, especially parking lots. However, the past, as inspiration, and present often should be comingled (Lowenthal, 1981). See Figure 4.09: Description Form for Cultural Preservation Classification, for the highlights of this system.

CLASSIFICATION SYSTEM NAME: Cultural/ historical resource classification

(1) GOAL/ INTENT: protection and planning

(2) METHOD/ PROCESS: Evaluation of inter-relationship and interaction of the attributes and qualities of the components in context of an area's physiography, ecological, and historical/cultural setting. A map is the final form taken.

(3) TYPE OF CLASSIFICATION:
a) aggregation
b) multi factor
c) single level
d) polythetic

(4) SCALE: local to regional

(5) KINDS OF INFORMATION: components (age, number) in their context (natural and historical setting)

(6) MANNER OF COLLECTION: decided on a site by site case

(7) COMPONENTS:
1) overall patterns of spatial organization
2) land use
3) response to natural features
4) circulation
5) boundary demarcations
6) vegetation related to land use
7) cluster arrangement
8) structures
9) small scale elements, such as grave markers
10) view or perceptual qualities

(8) RESULTING CLASSES:
1) rural historic district, defined by natural, political and cultural boundaries.
2) historic site
3) historic building
4) a historical object

Figure 4.09: Description Form for Cultural Preservation Classification. (Source: the author).

VISUAL RESOURCE MANAGEMENT

GOAL/ OBJECTIVE

The rationale is to be able to determine visual quality by a quantifiable means, permitting visual resources to be evaluated with the same importance as other resources (*i.e.*, timber, water). Another goal is assessment of the visual resource to determine vulnerability to impact of proposed actions on the landscape quality.

BACKGROUND

"[S]cenery contributes immensely to visitors enjoyment of outdoor activities" (Schroeder, 1983, p.189). Visual resources, sometimes regarded as an intangible commodity, are now, along with the more established and quantifiable resources, expected to be accounted for and quantified. For example, the Forest Service has been charged with considering scenic resources as important as timber, air, water and minerals (Bacon, 1975, p. 660). The Bureau of Land Management (BLM) is required to manage "in a manner that will protect the quality of..scenic.. resource" (BLM, 1980, p.8). These agencies and others have devised methods and models to evaluate visual quality.

Diverse individual elements comprise the visual resource. The visual resources system encompasses the observed landscape, the observer, and other non-physical parts called ephemeral (Litton, 1968, p. 43).

Visual quality can be interpreted by a landscape description, encompassing the whole of the landscape or its elemental parts. Another way to define quality in a visual way is to explain human interaction or human observation.

Zube's Categorization

To make sense of the myriad of definitions and unwieldy diversity of parts and studies, concepts, and theories, Zube has classified the visual resource collection into three approaches he calls "professional," "humanistic" and "behavioral" paradigms (1974, p. 105). These approaches are aligned with various disciplines, their associated concepts, and theoretical bases.

Behavioral and humanistic paradigms The behavioral and humanistic paradigms aim at understanding and predicting human responses to the landscape. They address the role of the observer in assessment of the landscape. Both are from psychological disciplines. The behavioral approaches emphasize the viewer as an observer responding to the landscape based on atavistic responses, while the humanistic paradigm focuses on people's interaction with the environment.

Ephemeral factors, those fleeting events or perceptions of an observer or inter-actor, are a factor only when observed and evaluated by people, and only used as a modifier in some applications in the professional paradigm.

Professional paradigm A classification system from the professional paradigm will be addressed here as it contains theory and concepts derived from the background of design professions.

The models in the professional paradigm rely on the expertise and judgement of professionals to determine landscape quality. The method employed is more descriptive than the other two and aims to provide consistent evaluation. Designers and ecologists are generally the professionals most often conducting evaluations. Reliance on professions to decipher the landscape eliminates dependence on the subjective opinions of the general public in preference rating.

PROCEDURE

Design professions, such as landscape architects, assess the landscape using individual visual design elements, briefly described below.

Models designed by these professionals have a use in urban, rural, and naturalistic landscapes. Artistic and design considerations are the focus. Four elements are used to determine the landscape character (BLM,1980).

Elements
All definitions are adapted from the Bureau of Land Management (BLM, 1980). They are used as the building blocks of art and of the landscape.

Line: A path that the eye follows when perceiving abrupt differences in form color texture. In the landscape ridges, skylines, structures, changes in vegetation, or individual trees and branches may be perceived as line.

Form: The mass or shape of an object, which appears unified; often defined by edge outline, and surrounding space. Trees, buildings, or hills would be defined as form.

Color: The property of reflecting light of a particular wavelength that enables the eye to differentiate otherwise indistinguishable objects.

Texture: The visual manifestation of the interplay of light and shadow created by variation in the surface of the object.

The combining of the landscape elements create an artist's arrangement organizing the landscape (BLM, 1986). (Litton (1968) and the U.S. Forest Service use elements of the landscape to form patterns described as compositional types.)

This combination or relationship is of interest here, so that perhaps landscape can be better described in terms of its physical parts, both natural appearing and artificial appearing. The natural components can include topography, surface water and vegetation. The scientific system each of these represent is not the important idea, but the artistic arrangement they form. These components translated in the landscape are trees, rocks, waterfalls, mountains, prairie grasses and so on and are the material of visual landscape art.

Artificial components are human-made or human-altered. Examples range in scale from a small stone marker to a large city. Non-built adaptations, land use patterns such as a plowed field, belong in this category.

The Bureau of Land Management's Visual Resource Inventory system ranks the scenic quality into 3 classes: Class A, containing outstanding characteristics; Class B, containing a combination of outstanding and common features; and Class C, containing common, for the physiographic region, characteristics. This ranking is built on seven key criteria which are a combination of the elements and landscape features. Using a numerical scale of one to five for each criteria, Class A has the highest numerical rating (see Fig. 4.10: Visual analysis form).

Key Criteria Explanation (BLM, 1986)

landform: topography

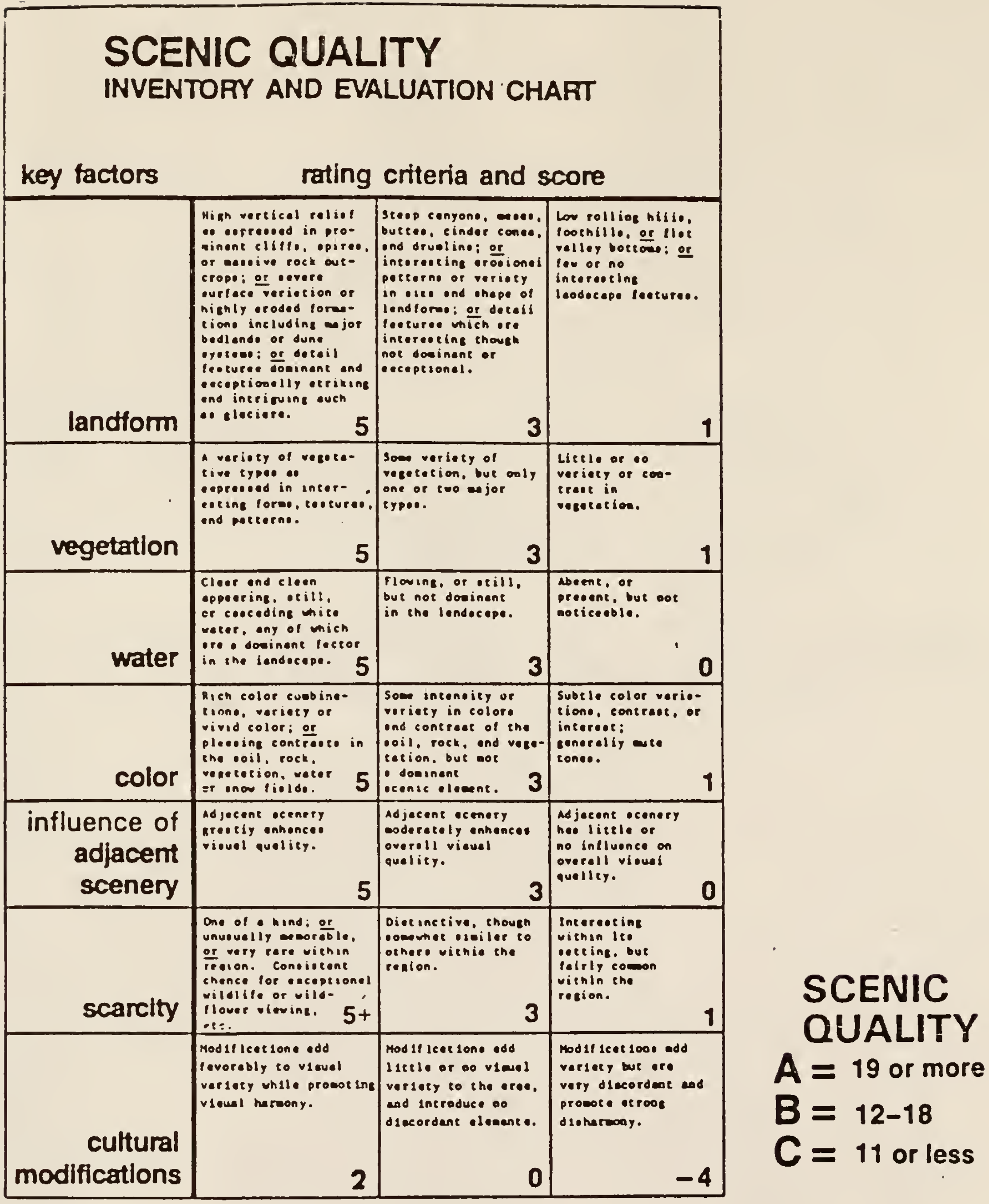
vegetation: their patterns, form and texture At a smaller scale they add detail to the elements.
water: adds movement and serenity. Its location or dominance is the critical point in assessing and scoring.

color: Variety, contrast, and harmony. In evidence during high use season are considered in ranking here.

adjacent scenery: Often scenery outside the rated area has an influence or impact on the rating. This criteria takes into account for those influences.

scarcity: Adds emphasis to an area that contains a feature of unusual significance or proportion in relationship to the normal scene of the rated area.

cultural modification: can both enhance or detract from an area. Modification can be to the land, water, vegetation or in the form of additions to the scene.



SCENIC QUALITY
INVENTORY AND EVALUATION CHART

key factors	rating criteria and score		
landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops; or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. 5	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. 3	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. 1
vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. 5	Some variety of vegetation, but only one or two major types. 3	Little or no variety or contrast in vegetation. 1
water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. 5	Flowing, or still, but not dominant in the landscape. 3	Absent, or present, but not noticeable. 0
color	Rich color combinations, variety or vivid color; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. 5	Some intensity or variety in colors and contrast of the soil, rock, and vegetation, but not a dominant scenic element. 3	Subtle color variations, contrast, or interest; generally mute tones. 1
influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. 5	Adjacent scenery moderately enhances overall visual quality. 3	Adjacent scenery has little or no influence on overall visual quality. 0
scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. 5+	Distinctive, though somewhat similar to others within the region. 3	Interesting within its setting, but fairly common within the region. 1
cultural modifications	Modifications add favorably to visual variety while promoting visual harmony. 2	Modifications add little or no visual variety to the area, and introduce no discordant elements. 0	Modifications add variety but are very discordant and promote strong disharmony. −4

SCENIC QUALITY

A = 19 or more
B = 12–18
C = 11 or less

Figure 4.10: Visual analysis form.

This is the form used by the Bureau of Land Management for inventory and evaluation of scenic resources. (Source: BLM, 1986, p. ILL. 2).

The next step, designation of management classes, involves a combination of a scenic quality class, formed from these criteria, a sensitivity level and a distance zone to arrive at a management class for an site. At the sensitivity levels, the observer/user becomes a part of the formula. A matrix is employed in the selection of a sensitivity level (high, medium, and low). Use volume and user or public attitude are the two components of determining sensitivity levels. Three distance zones, foreground- middle ground, background, and seldom-seen, are used to account for the impact the location has on the user/viewer. The four (plus one, identifying areas to be rehabilitated) management classes formed from maps of these three factors, delineate the amount of modification that can be allowed in each zone.

This system is aggregated, multi factor, single level and polythetic with a site specific scale. See Figure 4.11: Description Form for Visual Resource Classification.

REVIEW OF VISUAL RESOURCE MANAGEMENT CLASSIFICATION SYSTEM

Undisturbed lands and those lands in their natural state in mountainous western regions rate the highest quality utilizing this evaluation method. Some problems exist with the methodology, taking many people, with lots of time to reach a consensus. Definitions could be clearer and more scientific. Sensitivity levels are hard to apply (Grden, 1979). There is a question of validity in using this approach. The efforts should be made more mappable (Brown, *et al*., 1986).

CLASSIFICATION SYSTEM NAME: Visual Resource Management

(1) GOAL/ INTENT: a) make visual quality quantifiable b) assessment determine vulnerability to impact of proposed actions

(2) METHOD/ PROCESS:
a) for scenic quality: mapping the numerical ranking of elements, based on professional expertise,
b) for visual sensitivity: matrix
c) for distance zones: viewed then mapped
d) to form management classes: overlay maps of a) to c)

(3) TYPE OF CLASSIFICATION:
scenic quality classes are:
a) aggregation
b) multi factor
c) single level
d) polythetic

(4) SCALE: site specific

(5) KINDS OF INFORMATION: visual (pictures) and human input

(6) MANNER OF COLLECTION: photographs and maps

(7) COMPONENTS:
scenic quality classes: landform, vegetation, water, cultural modifications, color, adjacent scenery,and scarcity
sensitivity level: user attitude and use volume
distance zones: foreground/middleground, background, and seldom-seen
management (susceptibility) classes: above three

(8) RESULTING CLASSES:
scenic quality classes:
Class A- outstanding characteristics
Class B- a combination of outstanding and common features
Class C- common characteristics

Figure 4.11: Description Form for Visual Resource Classification. (Source: the author).

ECOLOGICAL LAND CLASSIFICATION FRAMEWORK

GOAL/OBJECTIVE

The ecological framework allows for flexibility in making resource decisions and consideration of the effects of alternate action. It also desires to provide a standard for identification across the entire U.S.

BACKGROUND

The ecological category of resource systems has, by far, the largest number of classification systems. Several have been described in an earlier section of this chapter. Even the single element (*i.e.*, lakes or vegetation) environmental systems use more than one ingredient when describing themselves and when creating the divisions. In other words, no part of the environment stands alone; each component or element is interwoven with all others. Bailey (1981) calls the elements subsystems and says each "can be understood only within context of the whole (p. 101)." Elements can include, but are not limited to, soil, vegetation, landform, water, and climate. Land features, not use, are the determinates of ecological classes.

The Ecological Land Classification Framework (Driscoll, *et al*. 1984) is based on earlier work by Driscoll and others in development of ECOCLASS (Driscoll, *et al*., 1983; Corliss, 1973; Buttery, 1978). Units are not necessarily spatial or contiguous but can still be mapped. The land is described by its individual elements; then the elements are combined in a variety of ways based on managerial needs. Four requirements were kept in mind when developing this environmentally integrated system. These four requirements are that the system 1) be based as much as possible on permanent land features and consistent with existing classification systems, 2) should be hierarchical, 3) should function with computers, and 4) use features that later can be identified on the ground. In addition, the framework can be revised when new information is made available. This system is hierarchical, aggregated, multilevel and polythetic.

PROCEDURE

The three elements used to produce ecosystems are soil, vegetation and water. Each element is divided into levels of scale. The information at the lowest level allows it to function for detailed site specific uses, while upper levels function for regional planning. The Soil Conservation Service's six categories represent the soil element. The vegetative element follows a classification system set up by UNESCO (United Nations Education, Scientific, and Cultural Organization). The aquatic portion is represented by a wetlands and water habitat hierarchy.

The soil system is hierarchical, using six levels, the top, or Order, level having ten members (Soil Conservation Service, 1975). In use in some form since 1938, the soil classification system of the Soil Conservation Service of the U.S. Department of Agriculture is widely used and often a model for development of other systems.

UNESCO determines divisions for vegetation on the climax (stable) plant community, rather than original plant communities. Ecological and sociological relationships are not implied in the classification and for that reason the classification is termed artificial. However information is supplied of an ecological nature and inferences can be generated (UNESCO, 1973). Use, except on cultivated land, of the climax community helps predict potential accompanying life. Modifiers, to show the consequence of disturbances, are applied to "normal" (conditions and climate) climax communities (Driscoll, *et al*., 1984). There are five classes in the top level of a six level hierarchy. The system allows for addition of information made available from further research (UNESCO, 1973).

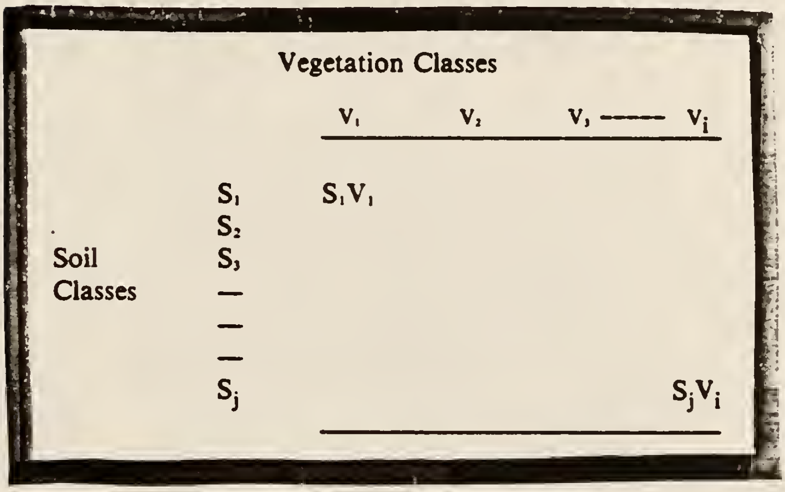
The U.S. Department of the Interior Fish and Wildlife Service, in conjunction with several other governmental agencies, developed a National Wetlands (including deepwater habitats) Classification and Inventory System. Wetlands are transitional areas, with a water table at or near the surface or under shallow water between land and deepwater (Cowardin, *et al*., 1979, p. 2). Primary objects were established for inventory, evaluation, and management of wetlands. Long range goals were to be able to describe wetland and deepwater habitats as ecological units of certain homogeneity, based on natural attributes (Cowardin *et al*., 1979). Wetlands are first divided into ecological systems, influenced by hydrological, geomorphological, and chemical factors. Bailey's (1980 (map, 1976)) province level of ecoregions is used at this level. A general water system (of which there are five) is the name of the result at high levels. Soil conditions, frequency of flooding, and the response of vegetation and wildlife define the lower levels (Tiner, 1984). This classification itself is hierarchal at three levels. Modifiers and special modifiers, for heavy modification (or creation) by man or beavers, are applied at lower levels. Wetlands are under seige by development, and require a system that is adaptable to changes.

Results of all three individual systems are applied to a descriptor element, landform. The integration is determined by relationships, all "working together to form an entity" (Driscoll, *et al.*, 1984, p. 14) from individual elements. Some uses preclude integration of the elements as all the information needed is available in one classification system. However, the use of existing systems provides this function.

Conditions that occur naturally between two elements form the first stage of integration. At the second stage of integration, a statistical process is being produced (Driscoll, *et al.*, 1984). The integration at this level is a description.

Elements are integrated and new ecological units formed, two elements at a time, by use of a matrix (see Fig. 4.12: Combination matrix of Ecological Land Classification Framework components). In addition to the ecological units framework, a spatial arrangement can be produced to help support the understanding of cause and effect relationships and analyze interdependence of such entities as wildlife, fisheries and recreation opportunities.

The final ecological system is hierarchal, aggregated, multi-leveled and polythetic.



		Vegetation Classes			
		V_1	V_2	V_3 ——	V_i
	S_1	S_1V_1			
	S_2				
Soil Classes	S_3				
	—				
	—				
	—				
	S_j				S_jV_i

Figure 4.12: Combination matrix of Ecological Land Classification Framework components.

This example uses soil and water. The resulting classes have attributes of each and a new unit is formed. (Source: Driscoll, *et al.*, 1984, p. 15).

REVIEW OF ECOLOGICAL LAND CLASSIFICATION FRAMEWORK

The formation of the system is currently in progress, so many pieces are yet to be devised. The use of existing classification systems follows the requirements for a good workable integrated system, as does its hierarchical character. See Figure 4.13: Description Form for Ecological Land Classification Framework.

CLASSIFICATION SYSTEM NAME: Ecological Land Classification Framework

(1) GOAL/ INTENT: make resource decisions and determine the effects of alternate actions

(2) METHOD/ PROCESS: comprised of existing systems, each having its own guidelines, in combination (by managerial needs), elements that have the same componential parts or are interrelated are combined at level one, using a matrix result is a descriptive statement, can be mapped

(3) TYPE OF CLASSIFICATION:
   a) aggregated
   b) multifactor
   c) hierarchical
   d) polythetic

(4) SCALE: site specific to regional

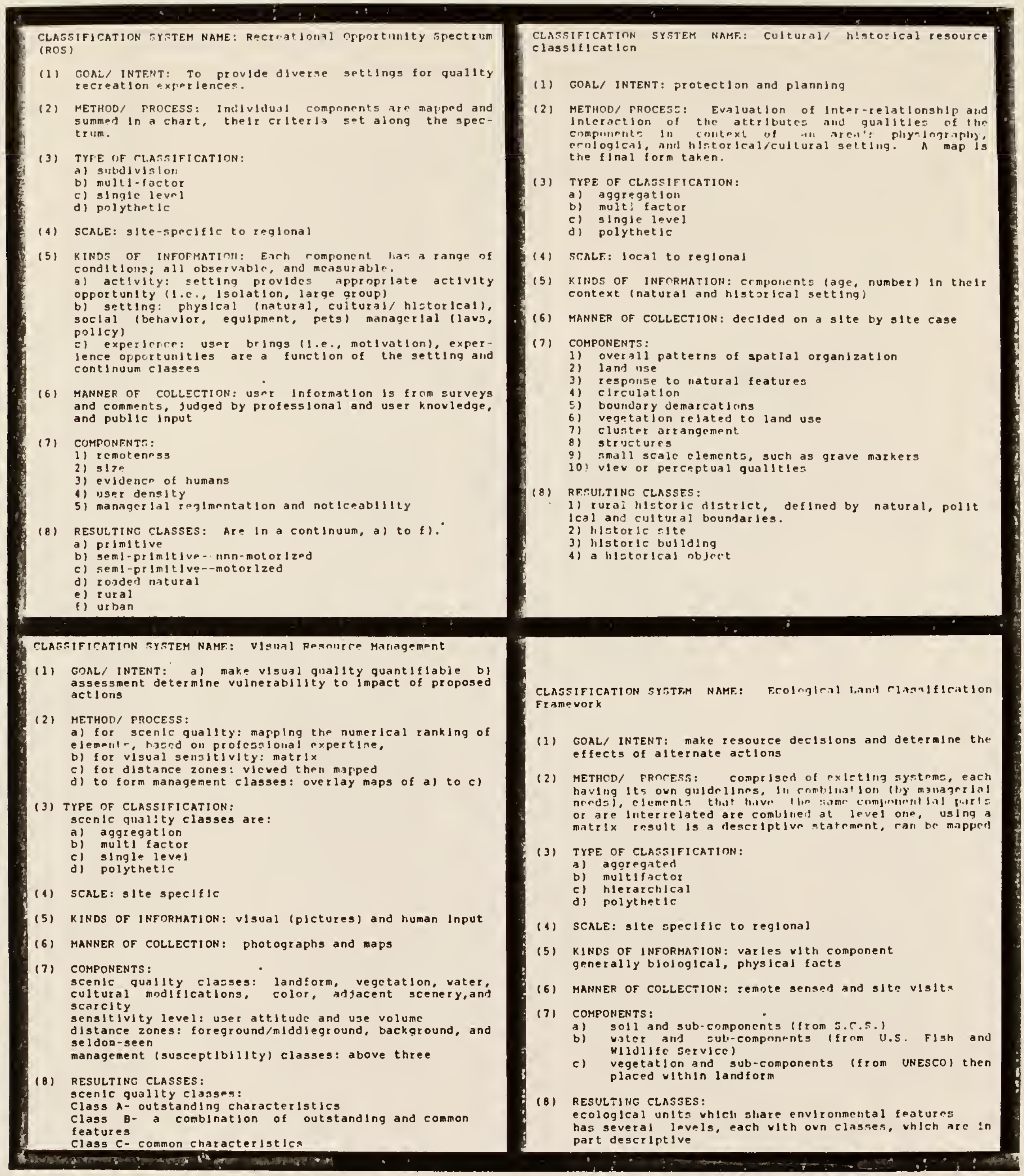
(5) KINDS OF INFORMATION: varies with component
generally biological, physical facts

(6) MANNER OF COLLECTION: remote sensed and site visits

(7) COMPONENTS:
   a) soil and sub-components (from S.C.S.)
   b) water and sub-components (from U.S. Fish and Wildlife Service)
   c) vegetation and sub-components (from UNESCO) then placed within landform

(8) RESULTING CLASSES:
ecological units which share environmental features
has several levels, each with own classes, which are in part descriptive

Figure 4.13: Description Form for the Ecological Land Classification Framework. (Source: the author).



CLASSIFICATION SYSTEM NAME: Recreational Opportunity Spectrum (ROS)

(1) GOAL/ INTENT: To provide diverse settings for quality recreation experiences.

(2) METHOD/ PROCESS: Individual components are mapped and summed in a chart, their criteria set along the spectrum.

(3) TYPE OF CLASSIFICATION:
a) subdivision
b) multi-factor
c) single level
d) polythetic

(4) SCALE: site-specific to regional

(5) KINDS OF INFORMATION: Each component has a range of conditions; all observable, and measurable.
a) activity: setting provides appropriate activity opportunity (i.e., isolation, large group)
b) setting: physical (natural, cultural/ historical), social (behavior, equipment, pets) managerial (laws, policy)
c) experience: user brings (i.e., motivation), experience opportunities are a function of the setting and continuum classes

(6) MANNER OF COLLECTION: user information is from surveys and comments, judged by professional and user knowledge, and public input

(7) COMPONENTS:
1) remoteness
2) size
3) evidence of humans
4) user density
5) managerial regimentation and noticeability

(8) RESULTING CLASSES: Are in a continuum, a) to f).
a) primitive
b) semi-primitive--non-motorized
c) semi-primitive--motorized
d) roaded natural
e) rural
f) urban

CLASSIFICATION SYSTEM NAME: Cultural/ historical resource classification

(1) GOAL/ INTENT: protection and planning

(2) METHOD/ PROCESS: Evaluation of inter-relationship and interaction of the attributes and qualities of the components in context of an area's physiography, ecological, and historical/cultural setting. A map is the final form taken.

(3) TYPE OF CLASSIFICATION:
a) aggregation
b) multi factor
c) single level
d) polythetic

(4) SCALE: local to regional

(5) KINDS OF INFORMATION: components (age, number) in their context (natural and historical setting)

(6) MANNER OF COLLECTION: decided on a site by site case

(7) COMPONENTS:
1) overall patterns of spatial organization
2) land use
3) response to natural features
4) circulation
5) boundary demarcations
6) vegetation related to land use
7) cluster arrangement
8) structures
9) small scale elements, such as grave markers
10) view or perceptual qualities

(8) RESULTING CLASSES:
1) rural historic district, defined by natural, political and cultural boundaries.
2) historic site
3) historic building
4) a historical object

CLASSIFICATION SYSTEM NAME: Visual Resource Management

(1) GOAL/ INTENT: a) make visual quality quantifiable b) assessment determine vulnerability to impact of proposed actions

(2) METHOD/ PROCESS:
a) for scenic quality: mapping the numerical ranking of elements, based on professional expertise,
b) for visual sensitivity: matrix
c) for distance zones: viewed then mapped
d) to form management classes: overlay maps of a) to c)

(3) TYPE OF CLASSIFICATION:
scenic quality classes are:
a) aggregation
b) multi factor
c) single level
d) polythetic

(4) SCALE: site specific

(5) KINDS OF INFORMATION: visual (pictures) and human input

(6) MANNER OF COLLECTION: photographs and maps

(7) COMPONENTS:
scenic quality classes: landform, vegetation, water, cultural modifications, color, adjacent scenery,and scarcity
sensitivity level: user attitude and use volume
distance zones: foreground/middleground, background, and seldom-seen
management (susceptibility) classes: above three

(8) RESULTING CLASSES:
scenic quality classes:
Class A- outstanding characteristics
Class B- a combination of outstanding and common features
Class C- common characteristics

CLASSIFICATION SYSTEM NAME: Ecological Land Classification Framework

(1) GOAL/ INTENT: make resource decisions and determine the effects of alternate actions

(2) METHOD/ PROCESS: comprised of existing systems, each having its own guidelines, in combination (by managerial needs), elements that have the same componential parts or are interrelated are combined at level one, using a matrix result is a descriptive statement, can be mapped

(3) TYPE OF CLASSIFICATION:
a) aggregated
b) multifactor
c) hierarchical
d) polythetic

(4) SCALE: site specific to regional

(5) KINDS OF INFORMATION: varies with component generally biological, physical facts

(6) MANNER OF COLLECTION: remote sensed and site visits

(7) COMPONENTS:
a) soil and sub-components (from S.C.S.)
b) water and sub-components (from U.S. Fish and Wildlife Service)
c) vegetation and sub-components (from UNESCO) then placed within landform

(8) RESULTING CLASSES:
ecological units which share environmental features has several levels, each with own classes, which are in part descriptive

Figure 4.14: All four Description Forms.

Task three: Compare resource classification systems.

The following section registers the considerations in response to comparison questions (pp. 35-36 in part two methodology chapter) and forms (see Fig. 4.14: All four Description Forms). Observations, in part, define the methodology for integration of the systems. The ecological/ natural aspect of the Blue Ridge Parkway is to determine developmental impact, as a visual scene, a cultural setting or to be interpreted as an educational experience. The visual system uses ecological systems components, however it uses a different aspect of each; landform, for variety it contains not as a descriptive fact, vegetation for texture, not growth and indication of conditions, and water, as a visual element, not a biological one. The cultural/ historical scheme considers the significance of its components within the framework of boundaries, including, ecological boundaries. One component of Visual Resource Management is cultural modification. While all cultural modifications are not of historic consequences, note could be made of those that are and then used in the cultural/ historical system when it is applied. While examining the information for the ecological system, component information could be noted for later use in other systems. Recreation Opportunity Spectrum appears to be independent of the other systems, as the environs play no part in the establishment of classes, except in minor ways. The connections are graphically displayed in Figure 4.15: Relationships among the four systems.

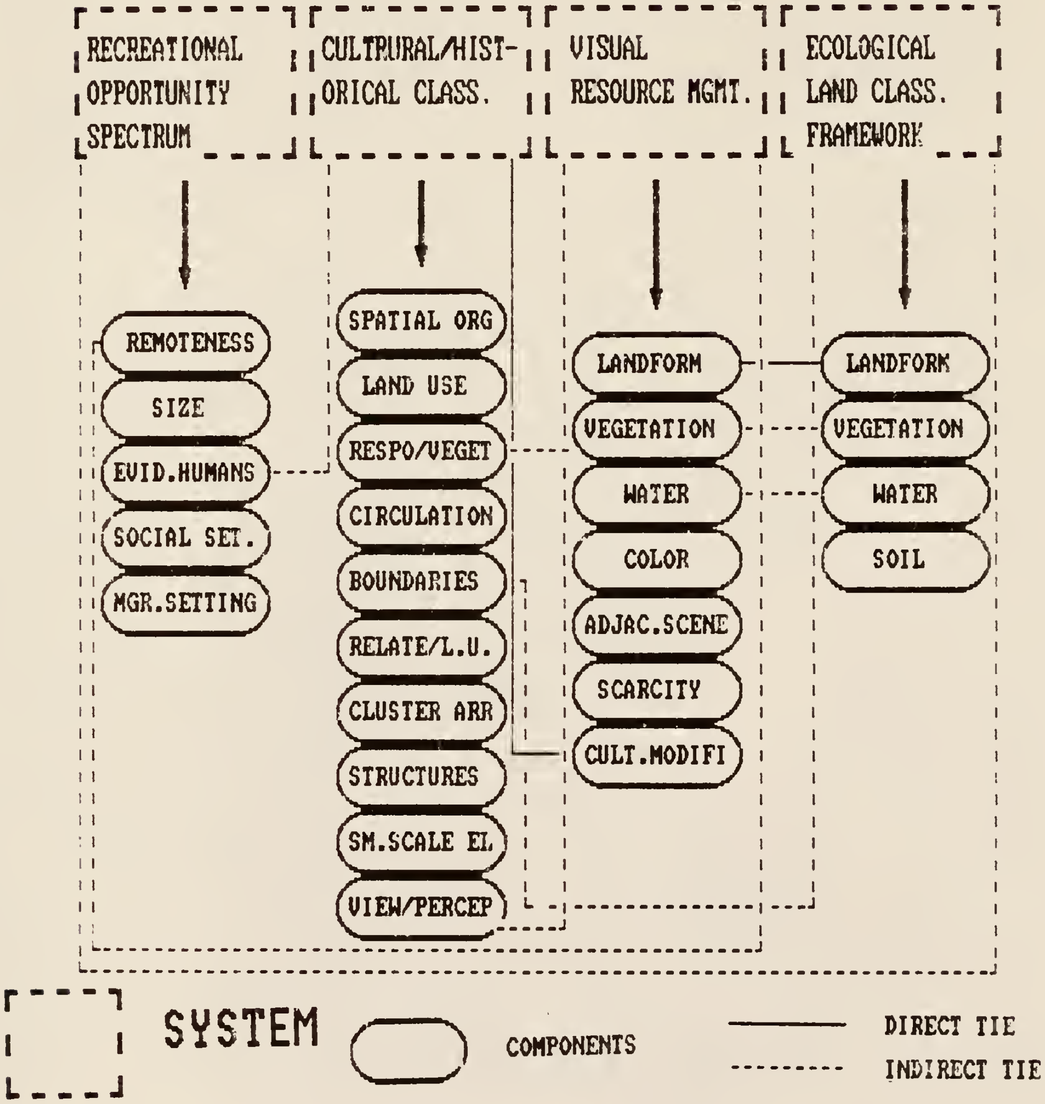


Figure 4.15: Relationships among the four systems.

The network of interactions among the four systems and their components is shown graphically. (Source: the author).

Task Four: Select integration technique, based on results of system comparison in task three, with the techniques of integration (defined in chapter two), management objectives and results wanted (determined in task one). Implement method.

Model, as a technique to integrate the system, was not considered, as enough connections exist to eliminate the need to establish a set of objectives for all. The idea does not, in this context, match the prerequisite for a valuable integration system. In addition, there is nothing to justify the establishment of one as more important than any other, so use of an importance value was eliminated. Only one, Ecological Land Classification Framework, was hierarchal, so the use of a matrix would be difficult, except at one level. The level or scale is not the same among the classification systems, an additional constraint to the use of a matrix for integration. A "rules of combination" integration technique was used. Application order was decided to be 1) Ecological Land Classification Framework (a) soil component, b) water, and c) vegetation element all placed on topography), 2) Visual Resource Management (VRM), 3) cultural/ historical classification system, and 4) Recreation Opportunity Spectrum. Ecological Land Framework will be combined and mapped, then act as a base for Visual Resource Management and cultural systems. The addition of high visual quality areas or significant cultural component to a particular ecological zone would add an element to the zone, and therefore management practices, not eliminate the environmental/ natural base. For this reason, Visual Resource Management and cultural classes are additions, not modifiers, to the zone. The Ecological Land Classification Framework will be mapped, then the next two will be mapped, and a composite map made. Recreation Opportunity Spectrum zones are primarily in response to settings, and place in the zones created by the other systems. As the Recreational Opportunity Spectrum manual states, "while recreation must have a physical base of land or water, the product--recreation experience--is a personal or social phenomenon" (United States Forest Service, circa 1979-1982, p.4) Therefore ROS classes are an independent consideration. There zoning does not affect or become affected by the other zones.

Two adjacent counties, Henderson and Transylvania in the southwest part of North Carolina, were selected for a detailed trial of the process. Figure 4.16: Henderson and Transylvania Counties in North Carolina is a location map. The parkway traverses about fourteen miles of Henderson County and approximately nine miles in Transylvania (approximately mile marker 400 to 422).

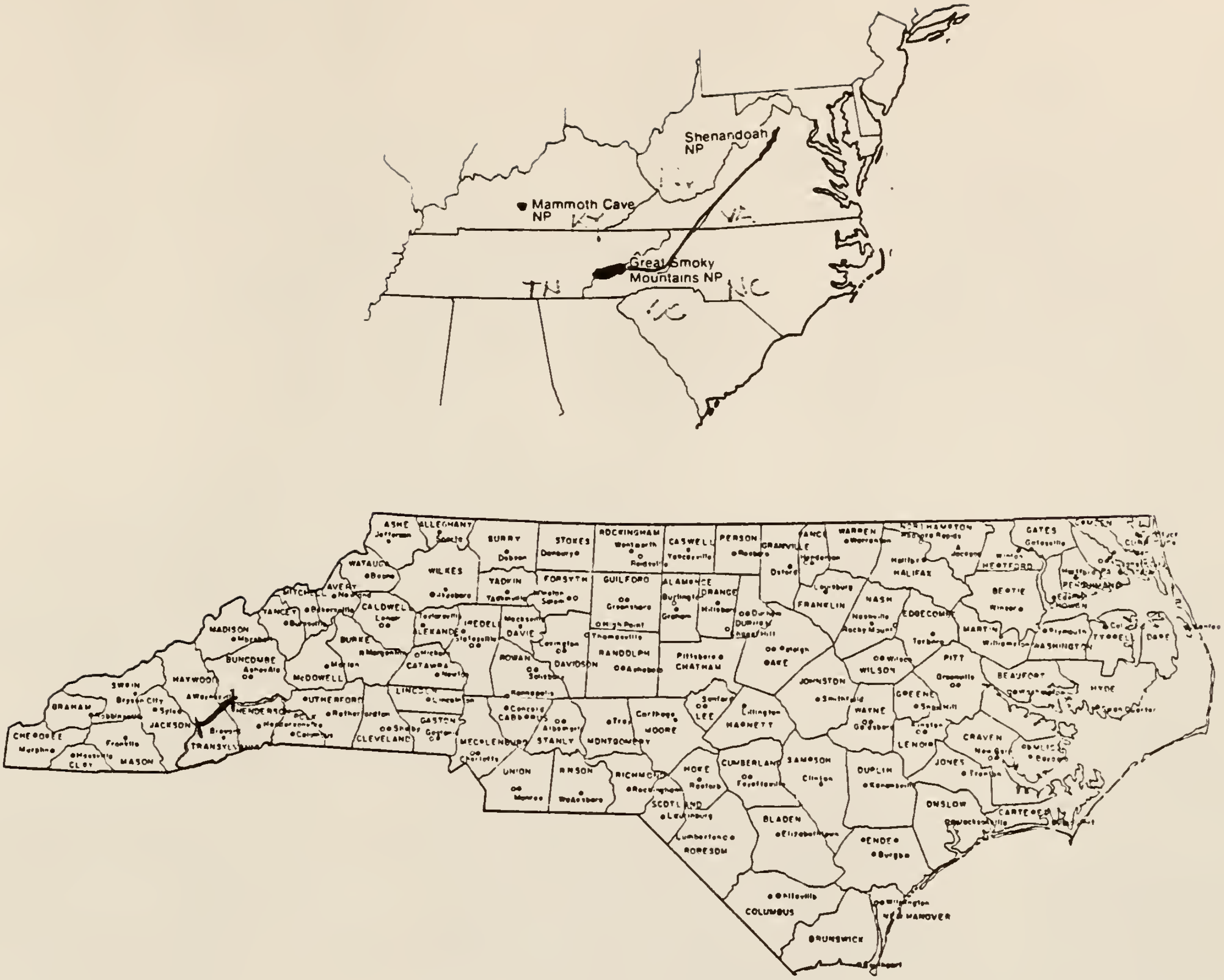


Figure 4.16: Henderson and Transylvania Counties in North Carolina. (Source: Runte, 1979, p. 95, and Lonsdale, 1967, p. 1).

Implementation

Maps, and in lieu of county-level site data, soil surveys, atlases, maps, and park brochures were assembled. At some places in the process, assumptions were made on the best information at hand, allowing the process to continue. Explanations are given at these junctures, as to the information used to make decisions. The interpretation may be questioned, yet the procedure itself will not suffer. Suppositions are required because of the gross scale of the maps and available information.

Applying Ecological Land Classification Framework (ELCF) All three components rely in some way on the landform, so it will be discussed first. Later it will be used as a descriptor when all three are integrated. Both Bailey (1976) and Fenneman (1938) identify the province this site is in as Blue Ridge Province. Province, in Bailey's system (described in chapter two), is the third level of identification. Humid temperate and hot continental are the Domain and Division, respectively. Blue Ridge, a relatively small province, is one to several ridges wide running in a northeast, southwest direction and varies in width from only five to fifty miles. The highest elevation in the eastern United States is in this province (see Fig. 4.17: General topographical map of Henderson and Transylvania Counties). The north end is narrower and lower in elevation. Except for cuts, and passes, the altitude in the northern half is generally from 1200 feet to 3000 feet (366-915 meters) (although some peaks are just over 4000 feet (1220 meters)). Wind and water gaps are from 900 to 1500 feet (274-1457 meters), depending on the elevation of the mountains around them. The southern half while generally wider is also taller. Elevation is 2000 to 5000 feet (610- 1524 meters) with forty-one miles over 6000 feet (1845 meters) high (the highest point is 6053 feet (1845 meters)). Some mountain ranges (*i.e.*, Pisgah) form ridges across the eastern continental divide. Most of the two counties are around 4050 feet (1235 meters). Wind and water gaps at 5700 +/- feet (1738 +/- meters) elevation are 4300+/- feet (1311 +/- meters) and at 6000+/- feet (1829 +/- meters) gaps are 5300+/- feet 1618 +/- meters).

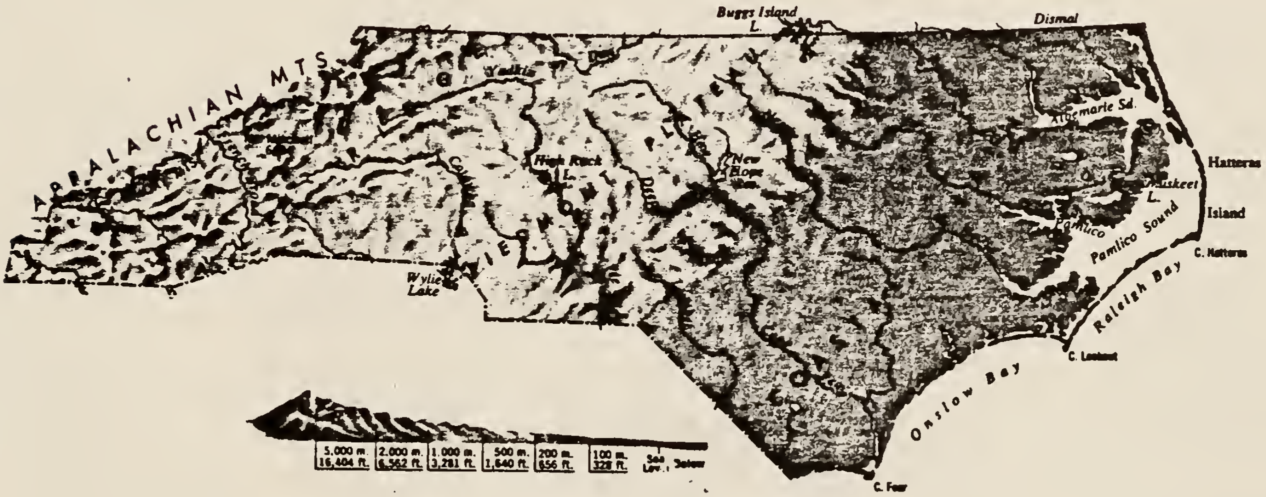


Figure 4.17: General topographical map of North Carolina including Henderson and Transylvania Counties. (Source: Hammond, 1979)

Vegetation component For lower system level classification, one should include site visits for complete information. The forests in this general area have more variety than anywhere else in the eastern United States. The altitude on this section of the Blue Ridge Parkway is 3200+/- to 4900+ feet (1000-1500 meters), which suggests a deciduous forest. On north and east slopes, and protected areas in undisturbed areas (*i.e.*, National Forests), are cove hardwood forests (Clay, *et al.*, 1975, and Londsdale, (dir.), 1967). These forests have a large variety of large trees, with only few shrubs, but a well-developed herb layer. Twenty-five to thirty varieties of trees are present, however eight (hemlock (*Tsuga sp.*), silverbell (*Halesia carolina)*, yellow buckeye (*Aesculus octandra*), white basswood *(Tilia heterophylla*), sugar maple (*Acer saccharum*), yellow birch (*Betula lutea*), tulip poplar (*Lirodendron tulipifera)*, and beech (*Fagus sp.*)) predominate. At 3500-4500 feet (1067-1372 meters) is the chestnut oak forest (Clay, *et al.*, 1975), with a well-developed shrub layer (*Rhododendron sp.* in moist sites and mountain laurel (*Kalmai latifolia*) in drier spots). In addition to chestnut oak (*Quercus montana*), other trees present would be red oak (*Quercus rubra*), red maple (*Acer rubrum*), flowering dogwood (*Cornus florida*), black gum (*Nyssa sylvatica*) and sourwood (*Oxydendrum arboreum*). Herbaceous plants would be unlikely. At 4500-5000 feet (1372-1524 meters) and in exposed, drier and open areas are oaks

(*Quercus sp.*). Pines (*Pinus* sp.) are present everywhere, especially in dry open ridges and appearing in large numbers after disturbances. Identification in the UNESCO system (1973) is the following: Class: I (forest), Sub-class: B (mainly deciduous), Group: 2 (cold deciduous with evergreen), and Formation: b (broadleaf, with evergreen needle). Much of the Blue Ridge Parkway passing through these counties is in Pisgah National Forest. Mapped version of this classification is shown in Figure 4.18: Vegetation map for Henderson and Transylvania Counties.

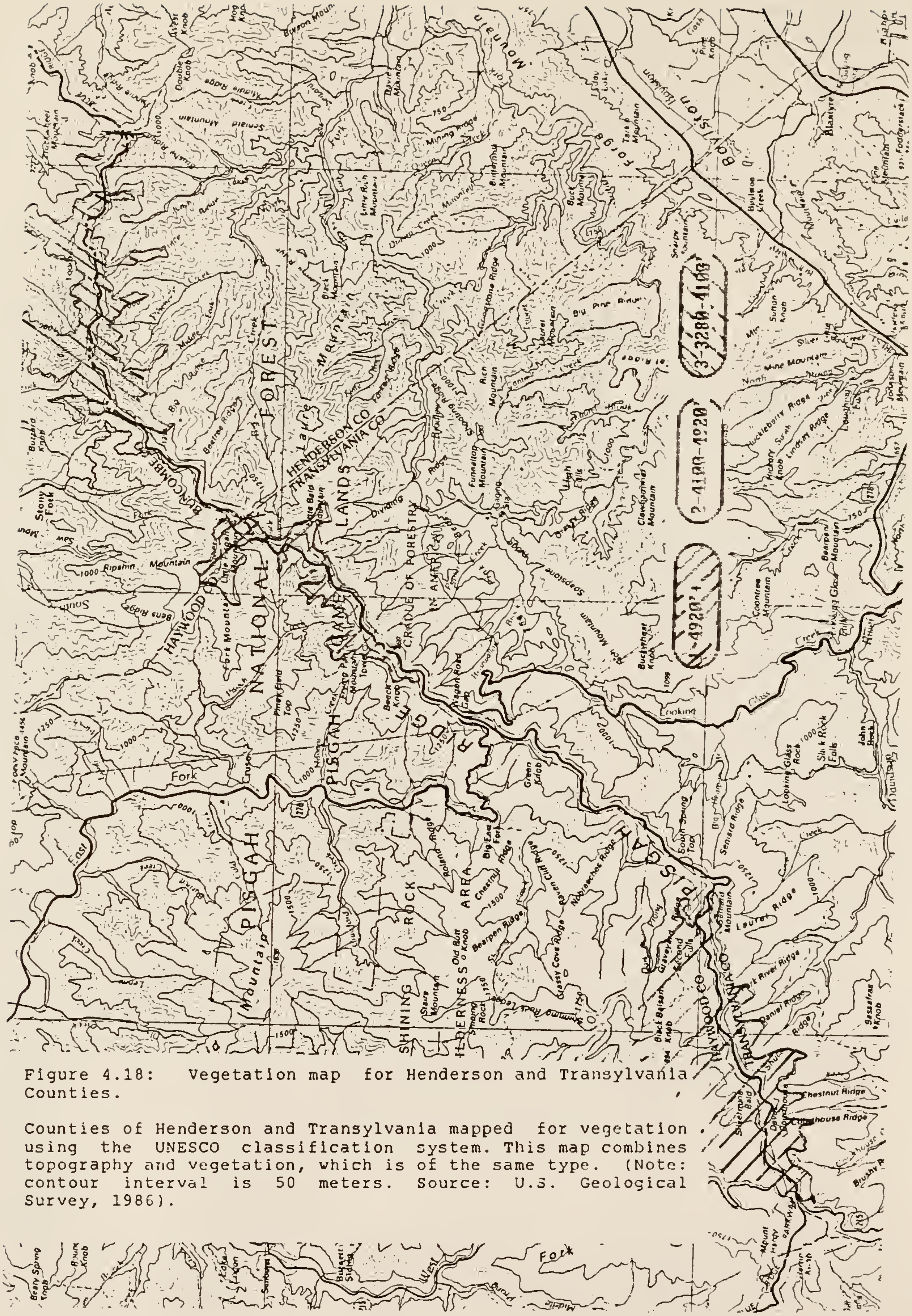


Figure 4.18: Vegetation map for Henderson and Transylvania Counties.

Counties of Henderson and Transylvania mapped for vegetation using the UNESCO classification system. This map combines topography and vegetation, which is of the same type. (Note: contour interval is 50 meters. Source: U.S. Geological Survey, 1986).

soil component Soil surveys are conducted by Soil Conservation Service on a county by county basis. Soil information (physical and chemical properties, parent material, and the effect of each on various uses) in addition to aerial photographs is included in each book. Soil Survey maps were consulted for soil associations, a grouping of series, the narrowest level of the hierarchical system (Soil Conservation Service, 1974, 1980). Series vary in texture, slope, stoniness and other characteristics which affect use. In mapping local areas, these differences are defined and divided into mapping units called phases. Soil in Henderson County was in the Ashe-Porters Association. In this area of the Blue Ridge Parkway, Ashe predominates with some Chandler series. These soils are found in steep areas which, along with stoniness, limit their use. Transylvania County has a wider variety of phases, 99% in the Brandywine-Porters-Burton Association. Protruding stones, especially just below ridges, appear more in this southern county. Soil of this type is a sandy loam with use limits, because of stoniness, lack of depth, and identification with steepness. Mapped soils illustrated are in Figure 4.19: Soils mapped for Henderson and Transylvania Counties.

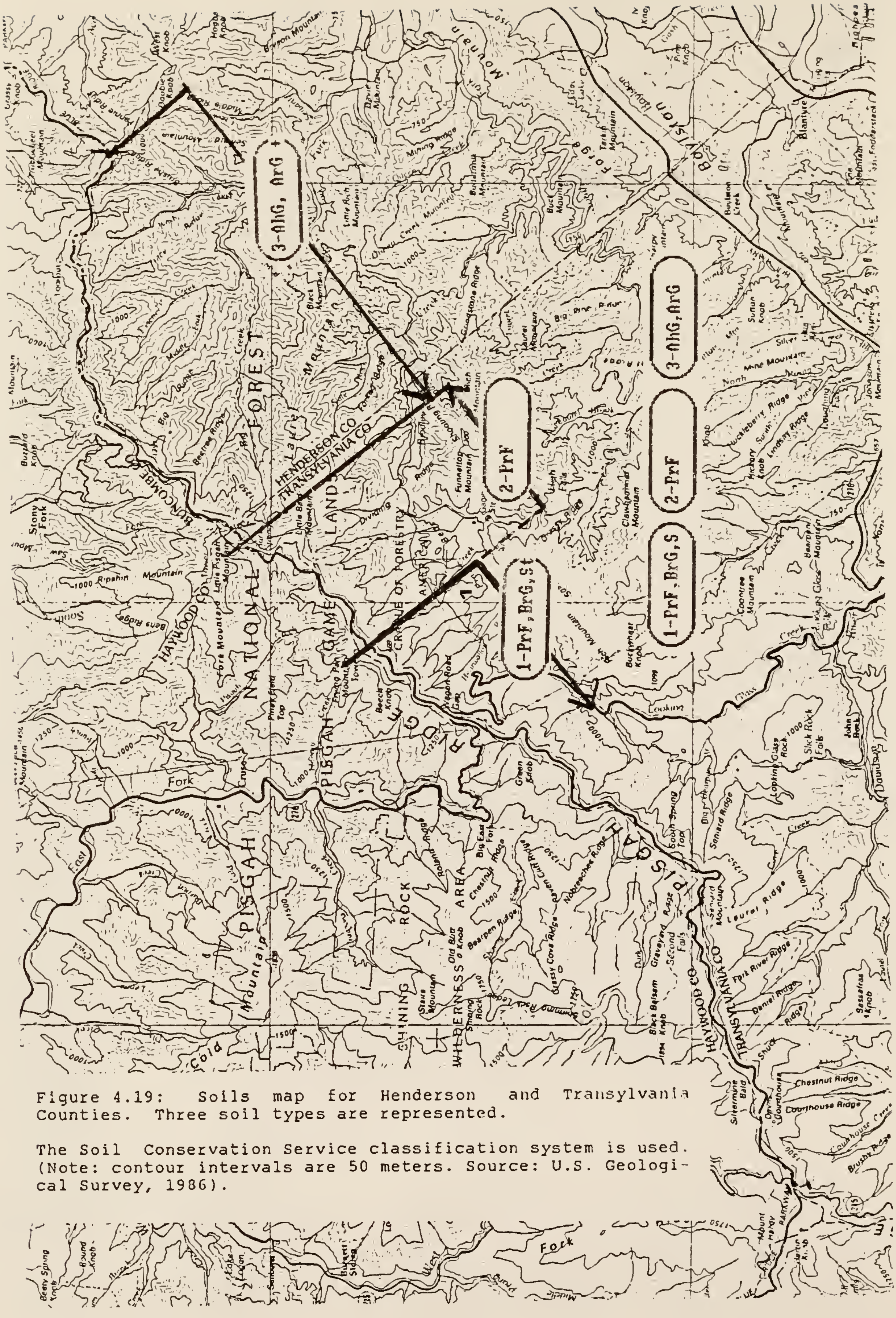


Figure 4.19: Soils map for Henderson and Transylvania Counties. Three soil types are represented.

The Soil Conservation Service classification system is used. (Note: contour intervals are 50 meters. Source: U.S. Geological Survey, 1986).

water component There is no standing water, nor rivers, in the Blue Ridge Parkway portion of the two counties. Transylvania and Henderson counties are on the east side of the eastern continental divide and drain into the Atlantic Ocean as part of the French Broad (River) drainage basin. The steepest slopes have only water runoff; however, other elevations classified using the system of the Fish and Wildlife (1979) are in System: Palustrine, and Class: forested wetland (see Fig. 4.20: Water systems and Fig. 4.21: Water map for Henderson and Transylvania Counties). No definitive information is available; this assumption was based on the high water table, the amount and type of vegetation, the closeness of head waters for creeks and a map showing runoff, high in this area (Clay, *et al*. (ed.), 1975. p.153). A special consideration is the quality of water, which in part of this area appears to be classified as 'A,' suitable for the purpose of residential and commercial water supplies (potable) (Clay, *et al*., 1975, p. 169). This designation is granted by the office of Air and Water Resources and has restrictions.

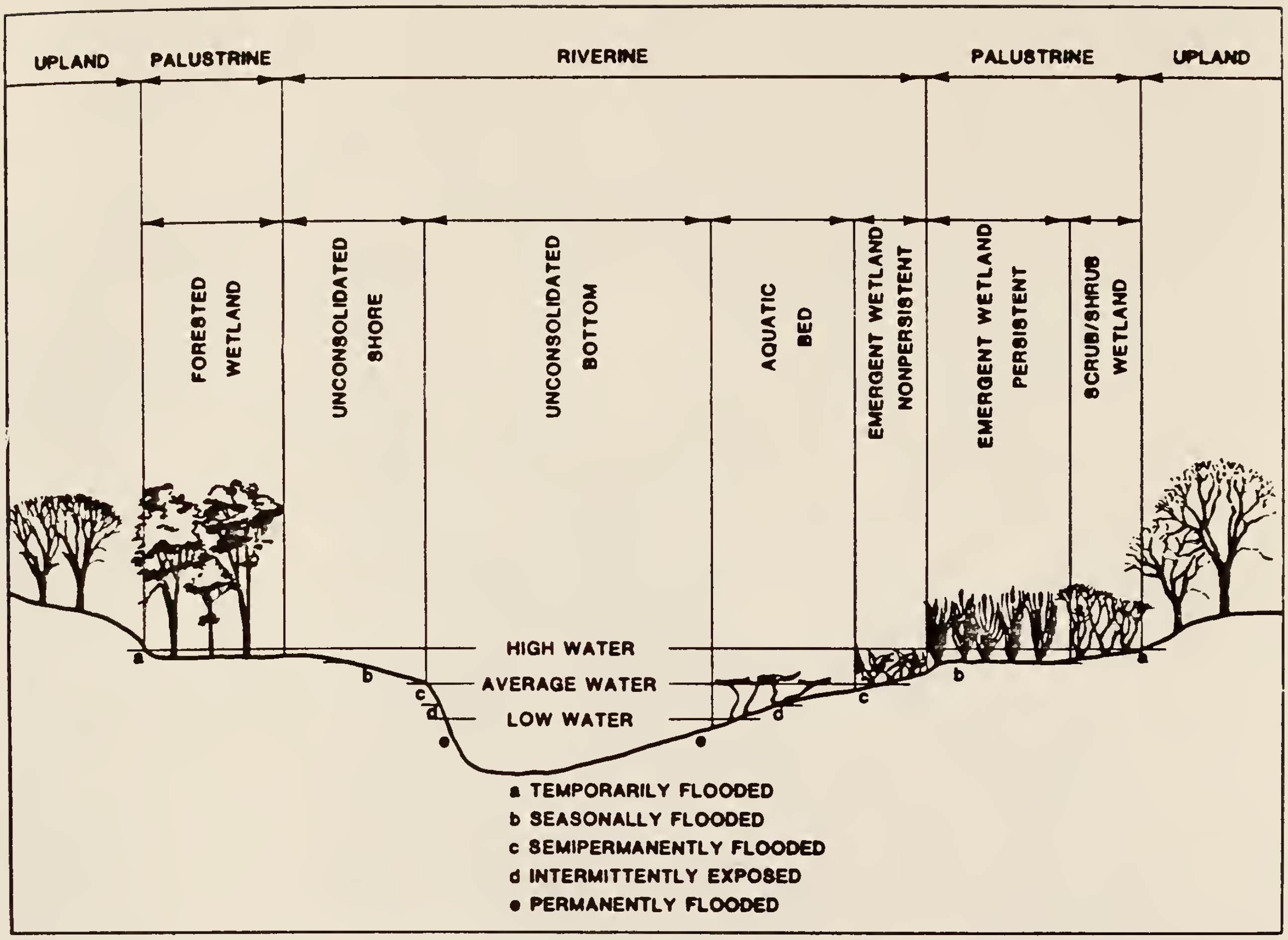


Figure 4.20: Water systems section.

A section represents the Palustrine water system in relationship to the adjacent systems. (Source: Cowardin, *et al.*, 1979, p. 11).

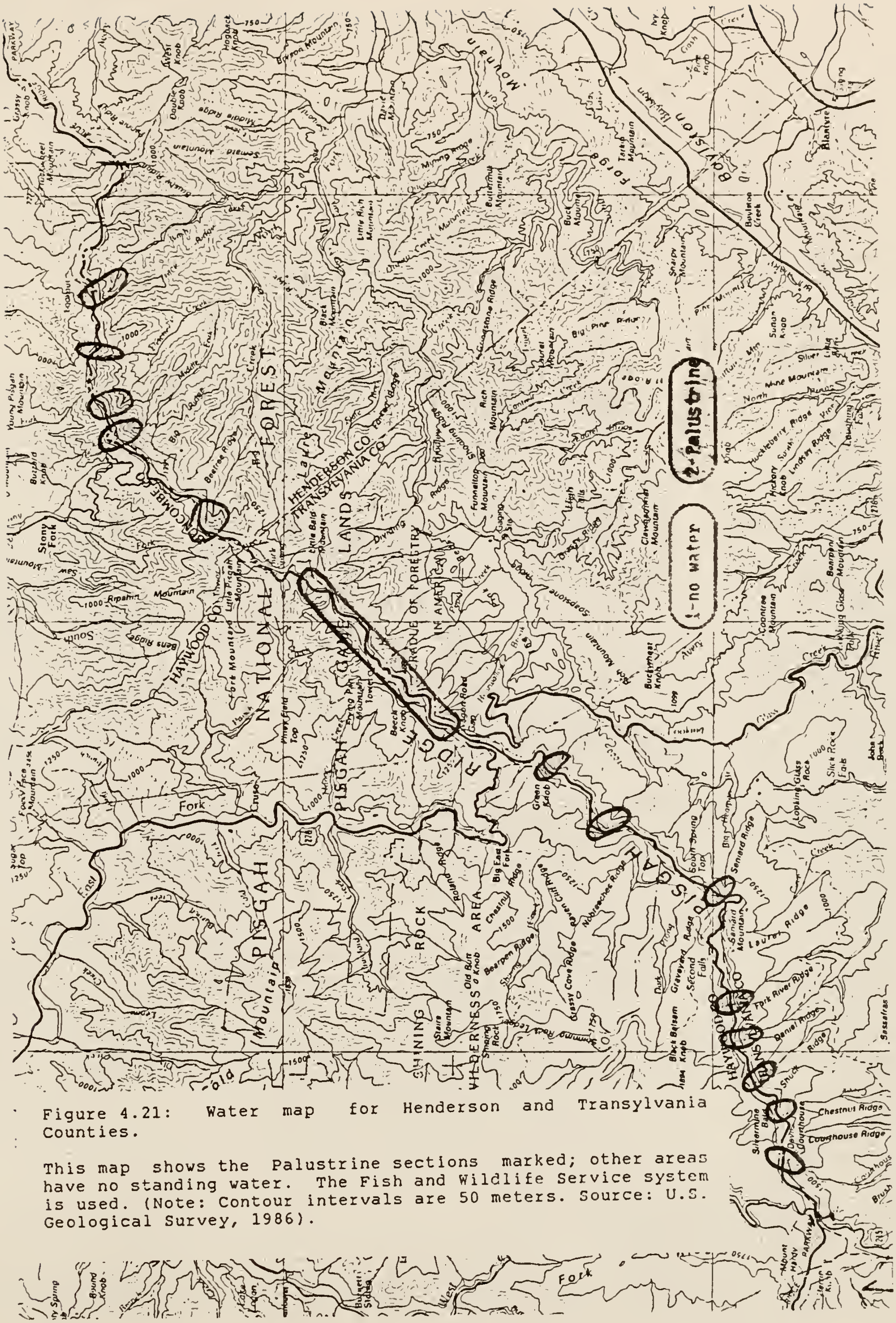
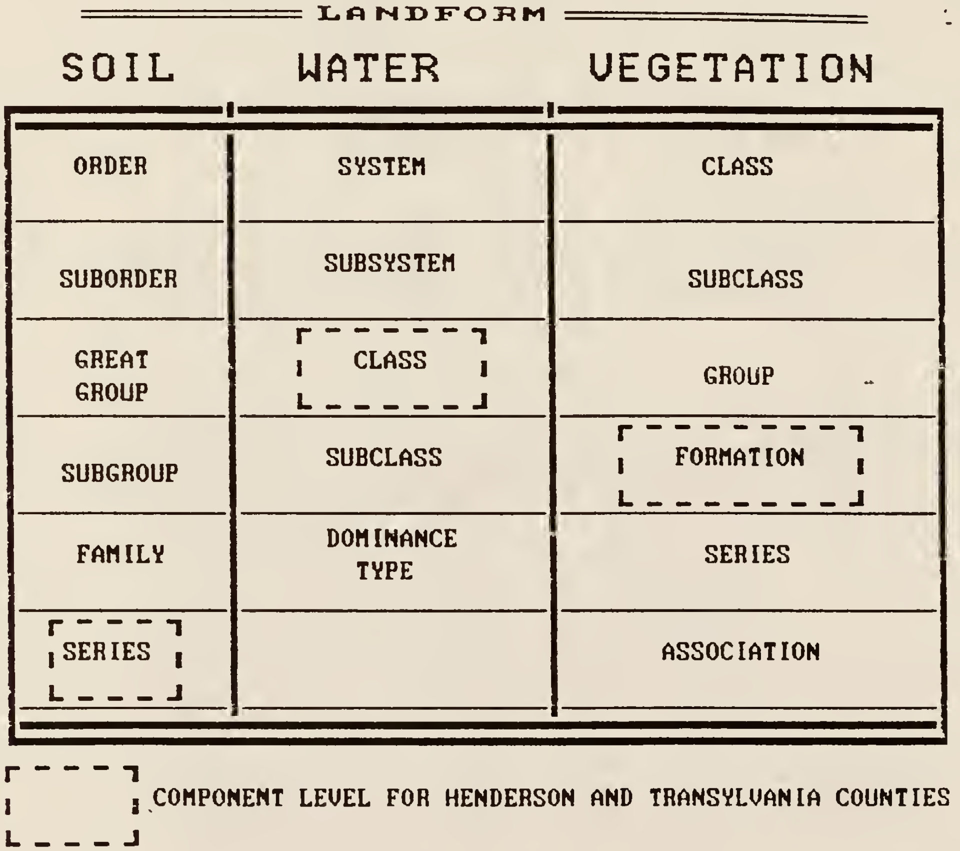


Figure 4.21: Water map for Henderson and Transylvania Counties.

This map shows the Palustrine sections marked; other areas have no standing water. The Fish and Wildlife Service system is used. (Note: Contour intervals are 50 meters. Source: U.S. Geological Survey, 1986).

Integration of the three ecological components Soil is classed, and therefore mapped only at the lowest levels; both water and vegetation will be used at a higher level. With the available information for the purposes of this study, these three can not be combined directly across levels. The matrix showing this is in Figure 4.22: Ecological Land Classification Framework matrix for Henderson and Transylvania Counties.



LANDFORM

SOIL	WATER	VEGETATION
ORDER	SYSTEM	CLASS
SUBORDER	SUBSYSTEM	SUBCLASS
GREAT GROUP	CLASS	GROUP
SUBGROUP	SUBCLASS	FORMATION
FAMILY	DOMINANCE TYPE	SERIES
SERIES		ASSOCIATION

COMPONENT LEVEL FOR HENDERSON AND TRANSYLVANIA COUNTIES

Figure 4.22: Ecological Land Classification Framework matrix for Henderson and Transylvania Counties.

This matrix represents the combination of the three components of the Ecological Land Classification Framework. (Source: adapted from Driscoll, *et al.*, 1984).

When each systems zones were identified, there were three topographic ones, with their associated vegetation (areas 4900 feet+ (1500+ meters), 4100-4900 feet (1250-1500 meters), and up to 3280-4100 feet (1000-1250 meters). Water had two zones (Palustrine or no surface water), and the soil system generated three (PrF and BrG with stony areas, PrF, and AhG, ArG with small pockets of other soils). Using minor localized variations would increase the number and alter distribution of zones within each system. Using topography as a base, an area was assigned a soil, vegetation, and water zone. Eleven zone combinations resulted (see Fig. 4.23: Determination of zone types for Ecological Land Classification Framework. These are mapped in Figure 4.24: Mapped results of Ecological Land Classification Framework for Henderson and Transylvania Counties.

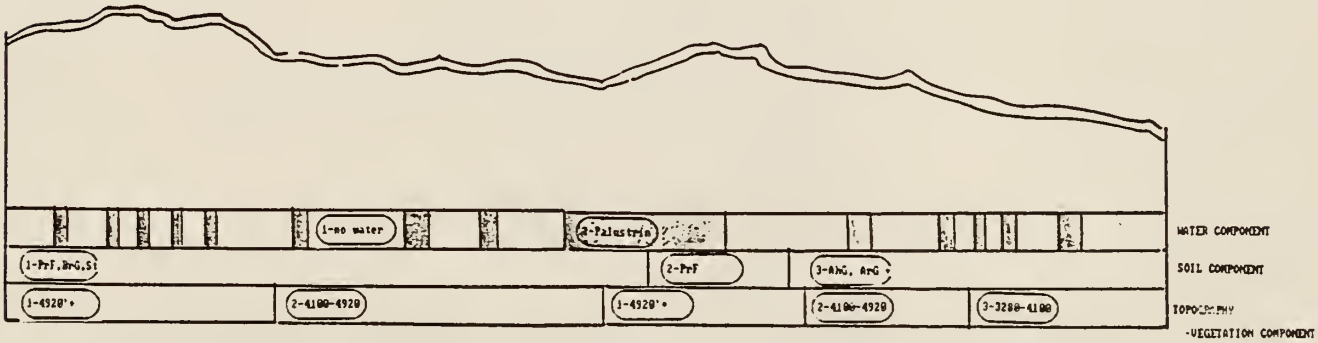


Figure 4.23: Determination of eleven zone types for Ecological Land Classification Framework. The top line represents the topography of this length of parkway. Starting with topography at the bottom, each component is added to obtain combinations of all three.

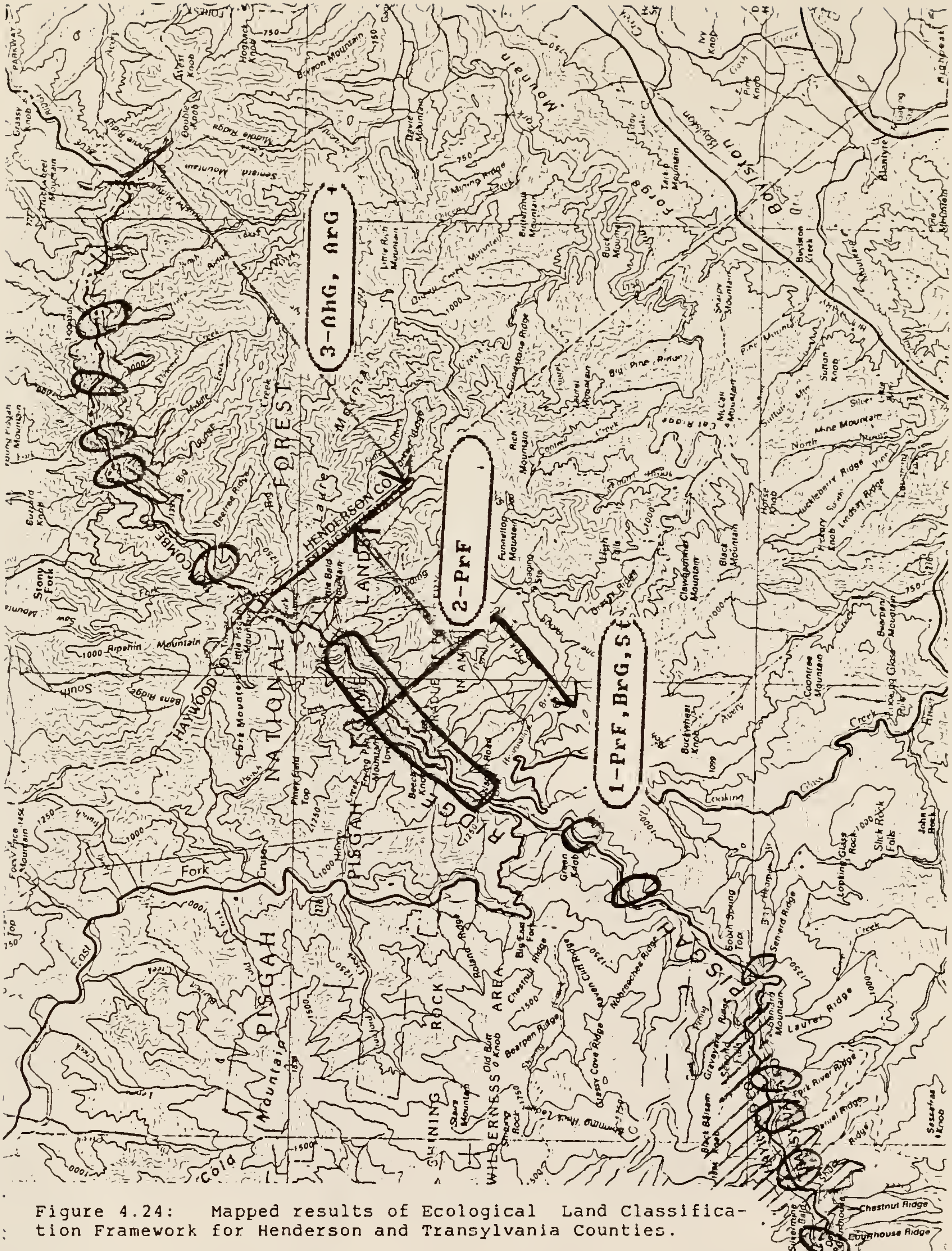
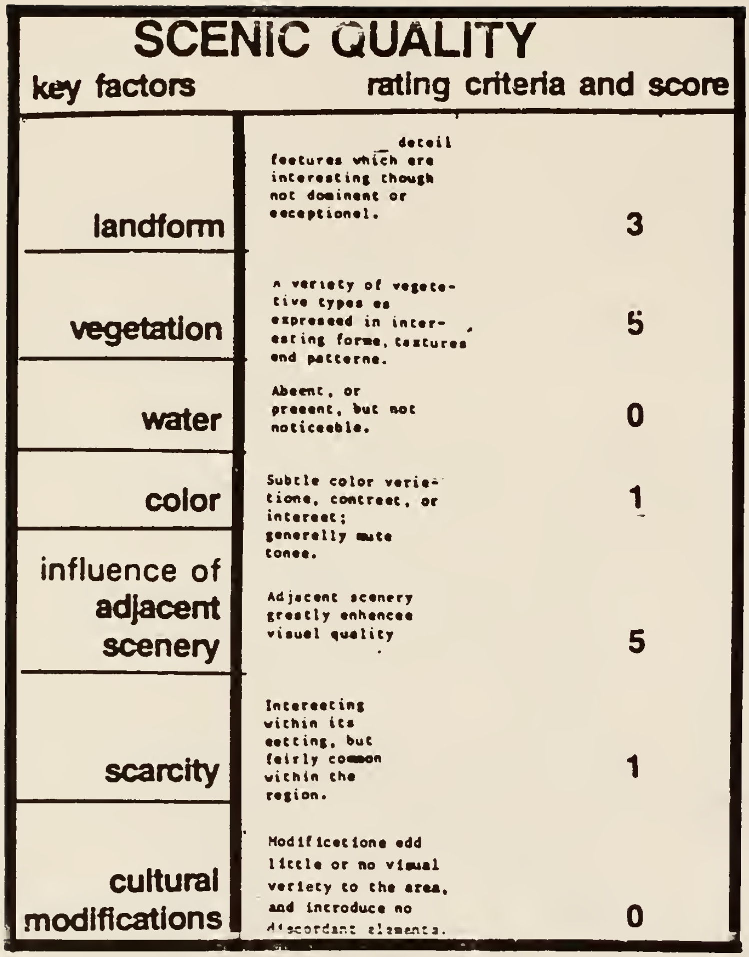


Figure 4.24: Mapped results of Ecological Land Classification Framework for Henderson and Transylvania Counties.

The eleven zone combinations are identified. (Note: contour interval is 50 meters. Source: U.S. Geological Survey, 1986).

Applying Visual Resource Management

From pictures in a variety of resources and maps available, the following numerical scores were assigned the components from the Bureau of Land Managements classification system. The total score is fifteen, which places this section in the Scenic Quality Class of B, those areas containing a mix of some outstanding and some common features for this physiographic region. Figure 4.25: Visual scores for Henderson and Transylvania Counties, presents the components and score.



SCENIC QUALITY

key factors	rating criteria	score
landform	detail features which are interesting though not dominant or exceptional.	3
vegetation	A variety of vegetative types as expressed in interesting forms, textures and patterns.	5
water	Absent, or present, but not noticeable.	0
color	Subtle color variations, contrast, or interest; generally mute tones.	1
influence of adjacent scenery	Adjacent scenery greatly enhances visual quality	5
scarcity	Interesting within its setting, but fairly common within the region.	1
cultural modifications	Modifications add little or no visual variety to the area, and introduce no discordant elements.	0

SCENIC QUALITY

B = 12-18

Figure 4.25: Visual scores for Henderson and Transylvania Counties. (Source: adapted from BLM, 1986).

Applying cultural/ historical classification system

This area of the country has a rich history of visual arts and crafts, musical (both country and folk traditions), and oral traditions of story telling. Architectural diversity provides examples from the 1700's to around 1840. Earlier history includes the story of the lives of Iroquois and Cherokee Indians. However, as gathered from the 1979 General Development Plan (National Park Service, 1979), atlases (Clay, *et al.*, 1975, and Lonsdale, 1967) and parkway brochures, this portion of the parkway has no districts, buildings, structures or objects of national or regional historical significance.

Applying Recreation Opportunity Spectrum

No inconsistencies exist for these two counties; the results of all setting components belong to the same or adjacent classes along the spectrum. The personality of the parkway tends to require its inclusion in "roaded natural," "rural", or "urban" (however, except for a few areas the nature of the parkway also eliminates urban) classes. The 'size' indicator factor also restricts the potential of a two-county area to the same three classes. This 22-mile stretch has little access, little evidence of man, and no towns near. Each component and with a corresponding class is listed in Figure 4.26: Recreational Opportunity Spectrum component results for Henderson and Transylvania counties.

RECREATION OPPORTUNITY SPECTRUM

Indicator Factor	Criteria	Class
Size	no size criteria	Roaded Natural or rural
Remoteness	within 1/2 mile of better than primative road	Roaded Natural
Evidence of Humans	natural setting w/ alterations seen to unseen/scattered structures	Roaded Natural
Social Setting	frequency of contact: moderate to high on roads; low to moderate on trails and off rd.	Roaded Natural
Managerial Setting	controls are noticeable but harmonize w/ natural environment	Roaded Natural

Figure 4.26: Recreation Opportunity Spectrum component results for Henderson and Transylvania Counties.

Size, Social Setting, and Managerial Setting could be Rural or Roaded Natural, but Roaded Natural was the best choice to include all indicator factors. (Source: adapted from USFS, circa 1979-1982).

Integration of Ecological Land Classification Framework, Visual Resource Management, Cultural/ Historical, and Recreation Opportunity Spectrum

To integrate the four systems, two maps (ecological, and visual) are overlaid. However, in this two-county area of the BRPW, the views, at this map scale, and with available pictures, were homogeneous as was the lack of significant cultural/ historical features. Visual features and cultural components are additions to each natural zone. This consistency does not change the number of zones from the number on the ecological map, nor the form of the map (Fig. 4.23: Mapped results of Ecological Land Classification Framework for Henderson and Transylvania Counties) used to map the eco-units.

Chapter four has implemented the decision-making process of the methodology chapter, using a two-county area of the Blue Ridge Parkway, a recreational unit of the National Park Service.

Results and analysis of the process application will be the focus of chapter five. Another aspect of the following chapter will be to analyze the effectiveness and practicality of the process itself. Conclusions and recommendations will complete the chapter.

CHAPTER FIVE: RESULTS, ANALYSIS OF FINDINGS AND CONCLUSIONS

INTRODUCTION

To aid managers who must balance current use in recreation areas with preservation for future use, land is divided into manageable units, defined by resources or uses. In response to parks with several resources, this thesis described a process to integrate these many systems into one set of zones. A case study, two counties along the Blue Ridge Parkway, were used to implement and examine the process. Result of the process and the implementation are included in this chapter. And finally, conclusions, and recommendations close this chapter.

RESULTS

It was possible to follow the process and combine classification systems (at least the ones selected to represent the resources of the BRPW). The ecological system was the only hierarchal one of the four. With the information at hand integration, at the same level, of that system was not possible. In addition, the other systems were not multilevel, rendering a non-hierarchal system.

The amount of information required to implement each system is large. Without data available from site visits and site inventories, assumptions had to be made to continue the process. These assumptions were made on information found on maps and in atlases.

Eleven zone types resulted from the application. Each zone represents a separate combination of soil, vegetation, topography, water, visual quality, and culturally significant elements (or lack thereof). Potential exists for more zones, defining separate units, in an area of the same size. In this case, if visual and cultural aspects of the site were not homogeneous, more zones would be present. Dominate zones or zone clusters might emerge when listing final zones across the entire length of the park, prompting a reduction in number.

All four systems are multi-factor (for type of classification) and components of all systems are intertwined in a multifaceted way. The parts, especially of the ecological system, interact in an extraordinary way as demonstrated by the relationship of the components of vegetation and topography, soil and topography, soil and vegetation, water and topography and, to a lesser degree, the components of soil and water. In many cases, when a type or class of one systems is present, a type or class of another tends to be present also, and a repeating combination is the outcome. For example, altitudes determine, in part (water is another), vegetation combinations. In addition, a zone change in one component, is often mirrored by a zone change in another component. Each elemental (single) resource system appears to be a structured from the others.

There are also interactions between other classification systems (topography and view, and vegetation and view).

ANALYSIS

As required of a case study, Henderson and Transylvania counties fully performed one function and partially performed the other two of the functions required. While it did not prove the hypothesis wrong nor show evidence of a new one, it also failed to conclusively confirm the hypothesis. However, these counties did add to the understanding of the parts of the whole.

The criteria, as discussed in the background chapter, in part help define a successful integrated system. Each criteria will be listed, and commented on for the application and resultant system.

Hierarchical. The resultant system is only in part heirarchical, because of the limits of the information available and the nature of some systems used, which themselves are not. However a final system could be, if specific systems are designated to be used with certain systems and incorporated at a given level of the base system.

Uses information already available. Yes, it uses information and language of existing systems, which are integrated in their own fashion. The very nature of the set-up (using existing systems) allows for the use of available information.

Allows for addition of new research or new systems. Yes, when selecting a system it is included in the comparison questions and the choosing of an integration technique. No special arrangements have been made for adding a new resource classification system.

Displays one set of zones. It does not, as ROS is applied over the top, independently of the others.

The large number of maps required (to access the entire length of the parkway) would be less if the site were a contiguous unit, not a linear parkway. Site visits and site inventories are important. The number of zones across the length of the parkway might be too many to adapt for management directives. Zones could be condensed further in number, looking to relationships between them for guidance. Use or proposed use could be another determinate in reducing the number of zones. Distinctions in one of the ecological components may not be of importance for a particular use. If this is the case, divisions could be combined. Also, the differentiations made in this two-county area might not be so important in a larger universe.

The four existing management zones within the National Park Service are more maintenance/ management activities and tend to limit or ignore the idea that a zone could be a combination, when one resource is present, the others are essentially ignored. However the use of the systems could determine these zones, knowing in advance they are to be used. A rules of combination would be used, the occurrence of, say, a cultural element would override the other resources and the zone would be a cultural one.

An ecological system in which zones are more than a description would be easier to use in a park situation, where the practical needs of management require zones to be a contiguous unit.

CONCLUSIONS

Some items which are not directly part of a mapped system, yet are necessary for complete prescription of procedures for management to follow, could be included during site visits for systems information gathering. To assure all buildings, visitor centers, roads, land uses, in-holdings (land within a park owned by another person or entity), geologic features, adjacent cities, and other geographic and political boundaries, are accounted for, all should be inventoried and mapped. Some of these things may be used in analysis for systems not represented in this case study.

A connected, rather than linear, park might have been a better test case, as the entire park not a portion could have been tested. However, in a way, the Blue Ridge Parkway was the starting point of this research.

A multi-disciplinary team, including landscape architects, will have the best chance to produce a workable solution with the systems as the amount and types of information gain much interpretation, which can be best accomplished by a trained person.

Additional characteristics of a classification system are likely to suggest or support a technique or order to integrate. This author found that integration techniques were not employed in their "pure" form; additions and variations were made during the application of each resource system. Each is just a variation on a theme. The techniques, except model which is outside the ideas expressed here, and matrix, which can be used in combination with the others, all are actually variations of one idea. All are relationship directed, which is one of the tests of a valuable integrated system, and their use suggests support criteria for a successful integration. The process was somewhat circular; until actual manipulation of systems components began, decisions for technique selection were only starting points.

Too many resources or classification systems would cause time and manipulation problems when applying the process.

Any site natural in character works best with the ecological system as the base system for integration. This is the resource having the largest effect, the most ties, and the most affected by changes. The environment would be present in every zone.

The final system should meet park goals, as the resource and use systems were selected on park functions and goals. However, actual implementation, zone division, and an evaluation by park personnel in light of park regulations would determine this.

Perhaps, less information on classification itself, and additional integration efforts of others could be a part of the background. The step to combine integration techniques and classification step was not scientific. A use of a matrix was contemplated, however was considered not effective because of the similar nature of the techniques and the recognized interaction among systems.

RECOMMENDATIONS

The finding of additional relationships or greater parallels among systems and their parts would allow more accurate integration. Another need for making a resultant system hierarchical would be investigations to determine at what level non-hierarchal systems fit into ones that are multilevel. A working team with knowledge of resources could take systems commonly used and devise a method or order of integration for them, requiring only revisions when applied to a park.

Somewhere between describing a zone to represent only the additional attribute and a zone being identified by the base with an additional ingredient is a satisfactory arrangement. Rather than identify a zone as being identified as a particular combination with either a visually or culturally significant resource, that zone should carry the importance, and be of the zoning for that predominant resource, not the originally designated environmental one. In these zones the significant resource becomes dominant and the original base the subdominant interest. In the case of portions of the Blue Ridge Parkway the visual resource is the strongest, and most important one. In these portions of the parkway this resource and not the ecological one should determine management decisions. This approach recognizes the importance of a landscape attribute, without ignoring the environmental base of the park.

A system for recreational opportunities tied to natural resources or setting should be considered, as the physical setting appears to have a bearing on the recreational experience.

REFERENCES CITED

Anderson, J. R., Hardy, E. E., Roach J. T., and Witmer, R. E. (1976). "A land-use classification system, for use with remote-sensor data." Circular 671. Washington, D.C.: U.S. Geological Survey.

Bacon, W. (1979). "The visual management system of the USFC, USDI". In: Elsner, G. H. & Smardon, R. C. (Ed.) "Our national landscape". General Technical Report PSW-35. Washington, D.C.: U.S.Forest Service. 660-665.

Bailey, R. G., Pfister, R. D. & Henderson, J. A. (1978). Land and resource classification- a review. Journal of Forestry. 76 650-655.

Bailey, R.G. (1980). Descriptions of the ecoregions of the United States. (with map (1976)). Miscellaneous Publication 1391. Ogden, Utah: U.S. Forest Service.

___________. (1981). "Integrated approaches to classifying land as ecosystems" In: Laban, P. (Ed.) Proceedings of the workshop on land evaluation for forestry. International Union of Forest Research Organization. The Netherlands: International Institute for Land Reclamation & Improvement. 95-105.

Belknap, R. K. & Furtado, J. G. (1982). "Three approaches to environmental resource analysis". Washington, D.C.: Conservation Foundation.

Brown, T. J., Keane, T., & Kaplan, S. (1986). "Aesthetics and management: Bridging the gap". Landscape & Urban Planning. 13. pp. 1-10.

Bureau of Land Management. (1980). Visual resource management program. Washington, D.C.: Department of the Interior.

__________________. (1986). "Visual Resources Inventory". Handbook # 8410-1. Washington, D.C.: Department of the Interior.

Buttery, R. F. (1978). "Modified Ecoclass--A Forest Service method for classifying ecosystems. In: Lund, H.G., La Bau, V. J., Ffolliott, O. F. & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 157-168.

Clark, R. N. & Stankey, G. H. (1979a). "Determining the acceptability of recreation impact: An application of the outdoor Recreation Opportunity Spectrum". In: Ittner, R., Potter, D. R., Agee, J. K. & Anschell, S. (Eds.) _Recreational impact on wildlands_. Pacific Northwest Region: Forest Service USDA. National Park Service, USDI. 32-42.

__________________. (1979b). "The Recreation Opportunity Spectrum: A framework for planning, management, and research".U.S.D.A. Gen. Tech. Rpt. PNW-98. Seattle: Pacific Northwest Forest & Range Experiment Station, USDA Forest Service.

Clawson, M. (1985). "Trends in use of public recreation areas". In: Wood, J. D., Jr. (Ed.). _Proceedings of the National outdoor recreation trends symposium_. Atlanta, GA.: U.S.D.I. National Park Service Southeast Regional Office. 1-12.

Clay, J. W., Orr, D. M., Jr., and Stuart, A. W. (Eds.). (1975). _North Carolina atlas_. The University of North Carolina Press.

Corliss, J. F. (1974). "Ecoclass: A method for classifying ecosystems" in _Foresters in land use planning_. Society of American Foresters. 264-271.

Cowardin, L. M., Carter, V., Golet, F. C., and LaRoe, E. T., (1979). _Classification of wetlands and deepwater habitats of the United States_. FWS/OBS-79/31. Office of Biological Services. Fish and Wildlife Service, U.S. Department of the Interior.

Driscoll, R. S., Merkel, D. L., Radloff, D. L., Snyder, D. E. & Hagihara, J. S. (1984). _An ecological land classification framework for the United States._ Miscellaneous Pub. 1439. Washington: 56 p.

Driscoll, R. S., Merkel,D. L., Hagihara, J. S. & Radloff, D. C. (1983). _A component land classification for the United States: Status report_. Technical Note #360. Denver CO.: USDI Bureau of Land Management.

Driscoll, R. S. (1978). "Panel IV-Land classification systems: Moderator's comments". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F., & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 155-156.

Driver, B.L., and Brown, P.J. (1978). "The opportunity spectrum concept and behavioral information in outdoor recreation resource supply inventories: A rationale. In: Lund, H. G., La Bau, V. J., Ffolliott, O. F., & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 155-156.

Driver, B. L., Brown, P. J., Stankey, G. H., Gregorie, T. G. (1987). "The ROS planning system: Evolution, basic concepts, and research needed". Leisure Sciences.9. 201-212.

Dunn-Rankin, P. (1983). Scaling methods. Hillsdale, N.J.: Lawrence Erlbaum Assoc.

Ellis, S. L., Fallat, C., Reece, N. and Riordan, C. (aka Ecology Consultants). (1977). Guide to land cover and use classification systems employed by western governmental agencies. Fort Collins, CO.: United States Department of the Interior, Fish & Wildlife Service.

Fabos, J. G. (1979). Total landscape: A guide to intelligent land use. Boulder CO.: Westview Press.

Fabos, J. G., & Caswell, S. J. (1979). Composite landscape assessment. Research Bulletin 637. University of Massachusetts at Amherst.

Fenneman, F. M. (1938). Physiography of the eastern United States. N.Y.: McGraw Hill.

Gilmour, J. S. I, (1951). "The development of taxonomy theory since 1851". Nature. 168. #4271. 400-402.

Gold, S. M. (1980). Recreation planning and design. N.Y.: McGraw Hill.

Grden, B. G. (1979). "Evaluation and recommendations concerning the visual resource inventory and evaluation systems used with in the Forest Service and the Bureau of Land Management". In: Elsner, G., & Smardon, R. C. "Our National Landscape". PSW 35. Berkeley, CA.: Pacific Southwest Forest and Range Experiment Station. United States Forest Service. 296-304.

Grigg, D. (1965). The logic of regional systems. Annals, Association of American Geographers. 55. 465-491.

Haas, G. E., Driver, B. L., Brown, P. J. & Lucas R. G. (1987). "Wilderness management zoning". Journal of Forestry. 85. 17-21.

Hamilton, T. E. (1978). "National Integrated inventories-Is what you need what you do?". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F., & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 136-139.

Hammond. (1979). Hammond's Medallion world atlas. Mapplewood, N.J.

Hammond, R. and McCullach, P. (1978). Quantitative Techniques in Geography. Oxford: Clarendon Press.

Henderson, J. A. & Davis L. S. (1978). "ECOSYM: A classification and information system for wildland resource management". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F., & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: Proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 384-389.

Heritage Conservation and Recreation Service. (1979). 3rd nationwide outdoor recreation plan, Appendix I: survey summary. Washington, D.C.: United States Department of the Interior

Houston, J. M. (1971). "The rural landscape". in Salter, C. L. The Cultural Landscape. Belmont CA.: Duxbury Press. 159-167.

Jolley, H. E. (1985). The Blue Ridge Parkway: The first fifty years. Blue Ridge Parkway (N.C. & VA.): Appalachian Consortium Press.

Kane, T. (1983). preface. In: Austin, H. P., Kane, T., Melnick, R. Z., and Turner, S.(Eds.) The yearbook for landscape architecture: Historic preservation. Van Nostrand Reinhold Co. New York. i.

Kelly, J. R. (1983). "Social benefits of outdoor recreation: An introduction". In: Lieber, S. R. & Fesenmaier, D. R. (Eds.) Recreation planning & management. State College, PA.: Venture Publishing. 1-14.

____________. (1985)."Benefits of recreation: Past, present, and future." in Wood, J. D., Jr. (Ed.). Proceedings of the National outdoor recreation trends symposium. Atlanta, GA.: U.S.D.I. National Park Service Southeast Regional Office.

Kleckner, R. L. (1981). "Classification systems for natural resource management". In: Richason, B. F., Jr. (Ed.) Pecora VII Symposium. Falls Church, VA.: American Society of Photogrammetry. 65-70.

Litton, R. B., Jr. (1968). Forest landscape description and inventory. PSW-49. Berkeley. CA.: Pacific Southwest Forest and Range Experiment Station. 64pp.

Lonsdale, R. E. (dir.). (1967) Atlas of North Carolina. Chapel Hill, N.C.: The University of North Carolina Press.

Lowenthal, D. & Binney, M., (Eds). (1981). Our past before us: Why do we save it?. London: Temple Smith Lmtd.

Lund, H. G. (1978). "Workshop wrap-up". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F., & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 481-482.

Maxwell, A. E. (1977). Multivariate analysis in behavioral research. N.Y.: John Wiley & Sons.

McHarg, I. L. (1969). Design with nature. N.Y.: Doubleday & Co.

MacLean, J. R., Peterson, J. A., & Martin, W. D. (1985, 4th ed.). Recreation and leisure: the changing scene. N.Y.: John Wiley & Sons.

Machlis, G. & Tichnell, D., (1985). The state of the worlds parks, Boulder, CO.: Westview Press.

Melnick, R. Z. (date unknown). *Cultural landscapes: An emerging concern for resource management*. unpublished paper.

______________. (1982). *Protecting rural landscapes*. George Wright Society. Washington, D.C.

______________. (1983). introduction. In: Austin, R.L., Kane, T., Melnick, R.Z., & Turner, S. (Eds.). *Landscape architecture and historical preservation*. N.Y.: Van Nostrand Reinhold Co.

______________. (1984). *Cultural landscapes: Rural historic districts in the National Park System*. Washington, D.C.: Department of the Interior.

Moss, M. R. (1986). "Landscape synthesis, landscape processes and land classification, some theoretical and methodological issues." in Davidson, D.A. (Ed.) *Land evaluation*. N.Y.: Van Nostrand Reinhold Co.

Nash, R. (1967). *Wilderness & the American mind*. New Haven, CT.: Yale University Press.

________. (1970). "The American invention of national parks". *American Quarterly*. *xxii* #3. pp.727-735.

National Park Service. (1976). *Draft Master Plan: Blue Ridge Parkway*. Washington, D.C.

______________. (1979). *Statement for management: Blue Ridge Parkway*.

______________. (1982). *Planning process guidelines*. NPS-2. Washington, D.C.

________________. (1986). "National Park Statistical abstract". Washington, D.C. U.S. Department of Interior.

______________. (1987). Organizational chart.

______________. (1988). Trip report notes. Unpublished.

______________. (circa 1988). *Statement for management: Blue Ridge Parkway*. Draft.

Ollier, C. D. (1977). "Terrain classification: Methods, applications and principles. In: Hails, J. R. (Ed.). *Applied geomorphology*. The Netherlands: Elsevier Scientific Publ. Co. 277-316.

President's Commission on Americans Outdoors (US). (1987). Americans outdoors: The legacy, the challenge-with case studies. Washington: D.C.: Island Press

Pulford, W. J. (1978). "Regional integrated resource inventories". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F. & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: Proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 140-142.

Riotte, R. J., Fabos, J. G. & Zube, E. H. (1975). "Model for evaluation of visual-cultural resources of the southeastern new England region". In: Zube, E. H., Brush, R. O. & Fabos, J. G. (Eds.). Landscape assessment: Values, perceptions, and resources. Stroudsburg, PA.: Dowden, Hutchinson & Ross, Inc. 254-273.

Rose, G. A. (1978). "A comprehensive inventory system for forest resource management". In: Lund, H. G., La Bau, V. J., Ffolliott, O. F. & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: Proceedings of the workshop". General Technical Report RM- 55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 463-468.

Runte, A., (1979 & 1987 (2nd ed.)). National Parks: The American Experience. Lincoln, NE.: University of Nebraska Press.

Schroeder, H.W. (1983). "Measuring visual features of recreational landscapes". In: Lieber, S. R. & Fesenmaier, D. R. Recreation planning and management. State College, PA.: Venture publishing. 189-202.

Shoard, M. (1981). "Why landscapes are harder to save than buildings". In: Lowenthal, D. & Binney, M., (Eds). (1981). Our past before us: Why do we save it?. London: Temple Smith Lmtd. 83-108.

Sjoberg, G. and Nett, R. (1968). A methodology for social research. N.Y.: Harper and Row.

Soil Conservation Service. (1975). Soil taxonomy. Agricultural Handbook No. 436. Washington, D.C.: U.S. Department of Agriculture.

Soil Conservation Service and Forest Service. (1974). Soil Survey of Transylvania County, North Carolina. Washington, D.C.: United States Department of Agriculture.

________________. 1980). Soil Survey of Henderson, County, North Carolina. Washington, D.C.: United States Department of Agriculture.

Sokal, R. R. (1974). Classification: purposes, principles, progress, prospects. Science. 185. 1115-1123.

Steiner, F. (1981). Ecological planning for farmlands preservation. Chicago, IL.: APA Planners Press.

Tiner, R. W., Jr. (1984). Wetlands of the United States: Current status and recent trends. Washington, D.C.: U.S. Department of Interior. Fish and Wildlife Service.

Tishler, W.H. (1982). "Historical Landscapes". Landscape Planning. 9. 91-103.

UNESCO (United Nations Educational, Scientific, and Cultural Organization). (1973). International classification and mapping of vegetation. Ecology and conservation. Series 6. Switzerland.

United States Forest Service. (circa 1979-1982). ROS users guide. U.S.Department of Agriculture.

______________________. (1973). "National Forest Landscape Management" vol. 1. #434.

United States Geological Survey. (1976). Henderson North Carolina/ South Carolina. 1:1000000 (map).

Walsh, R. G. (1986). Recreation economic decisions: Comparing benefits and costs. State College, PA.: Venture Publishing.

Wertz, W. A. and Arnold, J. F. (1972). Land systems inventory. Ogden, Utah: U.S. Department of Agricultural, Forest Service, Intermountain Region.

Whitmore, J. L. (1977). "Classification of ecosystems in land management planning". In: Forests for people. Washington, D.C.: Society of American Foresters. 299-303.

Zaslowsky, D. & The Wilderness Society. (1986). These American lands. N.Y.: Henry Holt & Co.

Zonneveld, I. S. (1981). "The role of single land attributes in forest evaluation". In: Laban, P. (Ed.) Proceedings of the workshop on land evaluation for forestry. International Union of Forest Research Organization. The Netherlands: International Institute for Land Reclamation & Improvement. 76-94.

Zube, E. (1974). "Themes in landscape assessment theory" . Landscape Journal. 3. #2. 104-109.

APPENDICES

A: Sources of additional information

The headings in this reference section represent the major topics in this thesis.

RECREATION

Driver, B.L. (Ed.). (1974). Elements of outdoor recreation planning. Ann Arbor, MI.: University of Michigan Press.

Leiber, S. R. & Fesenmaier, D. R. (1983). Recreation Planning and management. State College, PA.: Venture Publishing.

National Park Service. (1983). Winning support for parks and Recreation. Washington, D.C.: Venture publishing.

LAND ISSUES

Lynch, K. (1976). Managing the sense of a region. Cambridge, MA.: MIT Press

Davidson, D. A. (Ed). Land evaluation. New York: Van Nostrand Reinhold.

Kaplan, Stephan & Kaplan, Rachel. (1978). Humanscape: Environments for people. North Scituate, MA.: Duxbury Press.

Marsh, Wm. M. (1983). Landscape planning: Environmental applications. N.Y.: John Wiley & Sons.

Stilgoe, J. R. (1982). Common landscape of America 1580 to 1845. New Haven, CT.: Yale University Press.

NATIONAL PARKS and THE NATIONAL PARK SERVICE

Clawson, M. (1972). American's land & its uses. Washington, D.C.: John Hopkins Press.

Darling, F. Fraser & Eichhorn, Noel D. (1967). Man and nature in the National Parks: Reflections on policy. Washington D.C.: The Conservation Foundation

Everhart, William C. (1983). The National Park Service, Boulder, CO.: Westview Press.

Forester, R. R. (1973). Planning for man & nature in national parks. Surrey, England: Unwin Brothers Lmtd.

Ise, J. (1967). Our national park policy: A critical history. Baltimore, MD.: John Hopkins Press.

Junkin, E. D., (1986). Land's of brighter destiny. Golden, CO.: Fulcrum.

Nash, R. (1970). "The American invention of national parks". American Quarterly. xxii #3. pp.727-735.

Sax, J. L. (1980). Mountains without handrails, Michigan Press, Ann Arbor, MI.: University of Michigan Press.

CLASSIFICATION and INTEGRATION

Department of Regional Economic Expansion. (1970). The Canada Land Inventory. Report #6-1969. Ottawa, Canada.: Queens Printer for Canada.

Hopkins, Lewis D. (1977). "Methods for generating land suitability Maps: A comparative evaluation". AIP Journal. 386-400.

Redding, M. J. (1973). "Aesthetics in environmental planning". Environmental Protection Agency. Washington, D.C.: U.S. Government Printing Office.

Whitmer, R. E. (1978). "The USGS land use an land cover classification system". In: Lund, H. G., La Bau, V. J., Ffolliott O. F. & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 178-182.

CASE STUDIES

Clark, John, (1976). The Sanible report. Washington, D.C.: Conservation Foundation.

Jones & Jones. (1973). "Nooksack". Seattle, WA.

______________. (1975). "Upper Susitna River, Alaska". Seattle, WA.

BLUE RIDGE PARKWAY

Liles, G. (1980). The Blue Ridge Parkway: A unique part of rural America. Boone, N.C.: Appalachian Consortium Press.

Noe, F. P. & Hamitt, W. E. (Ed.). (1988). Visual preference of travelers along the Blue Ridge Parkway. Scientific Monograph 18. Washington, D.C.: National Park Service.

RECREATION OPPORTUNITY SPECTRUM

Brown, P. J., Driver, B. L., & McConnell, C. (1978). "The opportunity spectrum concept and behavioral information in outdoor recreation resource supply inventories: Background & Application". In: Lund, H. G., La Bau, V. J., Ffolliott O. F. & Robinson, D. (technical coordinators). "Integrated inventories of renewable natural resources: proceedings of the workshop". General Technical Report RM-55. Fort Collins, CO.: Rocky Mountain Forest & Range Experiment Station. Forest Service, U.S. Department of Agriculture. 73-84.

Buist, L. J. & Hoots, T. A. (1982). "Recreation Opportunity Spectrum approach to resource planning". Journal of Forestry. 80. 84-86.

Van Doren, C. S. (1985). "Social trends and social indicators"in Wood, J. D., Jr. (Ed.). Proceedings of the National outdoor recreation trends symposium. Atlanta, GA.: U.S.D.I. National Park Service Southeast Regional Office.

CULTURAL

Isar, Y. R. (1986). The challenge to our cultural heritage. Washington, D.C.: Smithsonian Institution Press.

Jackson, J. B. (1984) Discovering the vernacular landscape. New Haven, CT.: Yale University Press.

Landscape Architecture. (Jan. 1981). 71. #1.

Lynch, K. (1976). Managing the sense of a region. Cambridge, MA.: MIT Press.

Meinig, D. W. (Ed.). (1979). The interpretation of ordinary landscapes. New York: Oxford University Press.

Penning-Rowsell, E. C. & Lowenthal D. (Ed.). (1986). Landscape meanings and value. London: Allen & Unwin.

VISUAL

American Society of Landscape Architects. (1978). "Visual resource management". Landscape Architecture Technical Information Series. 1 # 2.

Anderson, Lee, Mosier, Jerry, Chandler, G. (1979). "Visual absorption capability". In: Elsner, G., & Smardon, R. C. "Our national landscape". Berkeley, CA.: U.S. Forest Service. Pacific Southwest Forest and Range Experiment Station. 164-171.

Arnheim, Rudolf. (1974). Art and visual perception. Berkeley, CA.: University of California Press.

Brown, Terry J. & Itami, Robert M. (1982). Study: procedures for landscape assessment and management -Australia". Landscape Journal. 1 # 2. 113-121.

Eckbo, Garrett. (1975). "Qualitative values in the landscape". In: Zube, Ervin H. Brush, Robert O. & Fabos, Julius G. (Eds.). Landscape assessment values, perceptions, & resources. Stroudsburg, PA.: Dowden, Hutchinson & Ross, Inc. 31-37.

Evernden, Neil. (date unknown). Landscape.

___________. (1981). "The ambiguous landscape". Geographical Review. 71. # 2 (April). 147-157.

Fridirici, Roxane, & White, Stephen E. (1986). "Kansas through the eyes of Kansans". GP Quarterly, 6 (winter). 44-58.

Jones, Grant R. (1978). "Landscape assessment" Landscape Architecture (March). 113-117.

Kaplan, Rachel. (1975). "Some methods & strategies in the prediction of preference". In: Zube, Ervin H., Brush, Robert O., & Fabos, Julius Gy. (Eds.). Landscape assessment values, perceptions, & resources. Stroudsburg, PA.: Dowden, Hutchinson & Ross, Inc. 118-129.

Laurizio, D. (1984). "A proposed inventory method for analyzing the visual resources for Alaska's North Slope." unpublished masters thesis. Manhattan, KS.

Litton, R. B., Jr. (1968). "Forest landscape description and inventories". Berkeley, CA.: U.S. Forest Service, Pacific Southwest Forest and Range Experiment Station.

__________. (1974). "Visual vulnerability of forest landscapes". *Journal of Forestry*. (July). 392-397.

__________. (1984). "Visual vulnerability of the landscape". Research Paper-WO 39. Washington, D.C.: Unites States Forest Service, U.S. Dept. of Agricultural. 28 p.

Litton, R. B. Jr., & Tetlow, R. J. (1978). *A landscape inventory framework: scenic analyses of the Northern Great Plains*. PSW 135. Berkeley, CA.: Pacific Southwest Forest & Range Station. 83 p.

Meinig, E. W., (Ed.). (1979). *The interpretation of ordinary landscapes*. New York: Oxford University Press.

Miller, Patrick A. (1984). "A comparative study of BLM scenic quality rating procedure and landscape preference" *Landscape Journal*. *3*. #2 (Fall). 123-135.

Penning-Rowsell, Edmund C. & Lowenthal, David, (Eds.). (1986). *Landscape meanings and value*. London: Allen & Unwin.

Taylor, Jonathan G., Zube, Ervin H. & Sell, James L. (1987). "Landscape assessment and perception research methods". In: Robert B. Bechtel, Robert B., Marans, Robert W. (Eds.). *Methods in environmental and behavioral research*. New York: Van Nostrand Reinhold Co. 361-393.

United States Forest Service. (1974). "The Visual Management System" Handbook # 462. Washington, D.C.: U.S. Department of Agriculture.

United States Forest Service. (1973). "National forest landscape management" Handbook 434. vol. 1. Washington, D.C.: U.S. Department of Agriculture.

Verdoorn, Joe T.& Mertes, J. D. (1977). *Visual management guidelines for second home development in wildland areas*. (review draft) Texas Tech. Lubbock, TX.

Yeomans, W. C. (1979). "A biophysical approach to visual absorption capability (VAC)". In: Elsner, Gary H. & Smardon, Richard C. (Eds.). "Our National landscape" GTR-35. Pacific Southwest Forest and Range Experiment Station: U.S. Forest Service. 172-181.

ECOLOGICAL CLASSIFICATIONS

Hills, G. A. (1960). "Regional site research". Forestry Chronicle. 36. 401-423.

Lewis, Phil H. (1964). "Quality corridors for Wisconsin". Landscape Architecture. 101-106.

National Park Service. (1987). Reconnaissance survey of the Roanoke River parkway corridor. Denver, CO.

Spurr, Stephan H. & Barnes, Burton, V. (1973). Forest ecology. New York.: Ronald Press Co.

RESOURCE CLASSIFICATION SYSTEMS: EVALUATION OF EXISTING SYSTEMS AND A METHOD FOR THEIR SYNTHESIS APPLIED TO THE BLUE RIDGE PARKWAY

by

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ABSTRACT OF A MASTER'S THESIS

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MASTER OF LANDSCAPE ARCHITECTURE

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Abstract

Leisure in the United States continues to increase in importance with the recognition of its benefits. Outdoor recreation, enjoyment and understanding of the outdoors, comprises one part of leisure. Recreation areas, including national park holdings must be managed efficiently to provide opportunity for recreation, yet conserve park resources. The responsibilities of this dual aim, in an environment of limited resources, makes management of these recreation areas a complex job.

Resource classification systems are used in the identification, and division of a park into manageable areas, set apart by their uniqueness. Management decisions and prescriptions are developed for these divisions. However, when a park has more than one significant resource, the complex job of management becomes more difficult. In part, the difficulty is caused by the defining of several set of zones. This thesis offers a step by step process for combining existing resource classification systems. By reducing the number of zones, management of time, and resources is more efficient.

Classification groups objects and helps people make sense of their surroundings. Groups can be formed based on like characteristics or on relationships, which is the preferred method as this provides more learning and solid results.

An area in southwestern North Carolina along the Blue Ridge Parkway (BRPW), a linear, slow-speed road traversing 469 miles of North Carolina and Virginia, is employed as a case study, to apply and test the proposed process. The parkway is managed as a scenic parkway within the National Park system.

The four resource classification systems representing the resources of the Blue Ridge Parkway used in this study are Recreational Opportunity Spectrum (ROS), Visual Resource Management (VRM), a cultural/ historical classification system, and Ecological Land Classification Framework (ELCF). The integration of the four classification systems resulted in eleven management zone types. Recreation opportunity settings range along a continuum from primitive at one end and urban at the other. The goal of classification for the VRM is to permit these resources to be quantifiable and to understand the impact of various actions. Identification of areas or objects that are meaningful to an area or to a region is the intent of the cultural/ historical classification system. Three existing governmental systems for soil, wetlands, and water are combined to form ecounits for the ELCF.

Interrelationships among the systems and their parts were striking. The need to reduce the number of resulting zone types indicated an additional step was necessary to cluster like units. A deeper understanding of relationships of system parts would aid in zone identification. Knowledge provided by on-site investigation could serve to reduce the total number of zones. Integration of systems is a way to allow demonstration of system component interrelationships and express importance of resources.